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FEBRUARY 13, 1956

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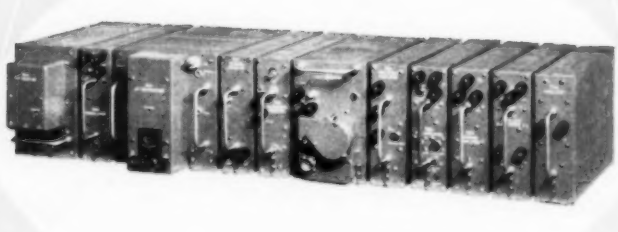

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INDUSTRY AIDS FOR THE ASKING

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BRASS & ALUMINUM NUTS. A 16-page catalog covering its complete line of turned brass and aluminum nuts has been issued by the Fischer Special Manufacturing Co.
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UHF ATTENUATORS. Stoddart Aircraft Radio, Inc. has issued an 8-page brochure illustrating and describing its line of coaxial attenuators and coaxial line terminations.
Circle No. 102 on Reader Service Card.

SHAPING HONEYCOMB MATERIALS. A bulletin (No. 156) that describes a new process of shaping honeycomb materials electrolytically, rather than by ordinary grinding methods, is offered by Anocut Engineering Co.
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ELECTRIFICATION. The Cleveland Crane & Engineering Co. offers a catalog (No. 2021-A) describing and illustrating its "Inverted-Y" aluminum conductors, supports and collectors for applications requiring current of 300 to 1,000 amperes.
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HYDRAULIC LIFTS. An 8-page brochure issued by the Oster Manufacturing Co. covers the company's new line of manually propelled, hand- and battery-powered hydraulic lifts with capacities of 500 to 2,000 lbs.
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NEOPRENE. E. I. du Dont de Nemours & Co., Elastomers Division, offers the latest copy of its "Neoprene Notebook," (No. 67), which includes a comparison of the resistance of rubber and neoprene to ozone and corona.
Circle No. 106 on Reader Service Card.

CONTACT MODULATORS. Airpax Products Co. has issued a revised edition of its bulletin No. 103, which describes the theory and application of the contact modulator, popularly called the "chopper."
Circle No. 107 on Reader Service Card.

IRON POWDERS. Uses of electrolytic and reduced iron powders in the manufacture of commercial and industrial products are described in a 12-page bulletin offered by Plastic Metals Division of National-U. S. Radiator Corp.
Circle No. 108 on Reader Service Card.

ELECTRICAL SPECIALTIES. A 52-page catalog including complete technical and descriptive data on its Levolier line of electrical specialties has been issued by the McGill Mfg. Co.
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GEAR BOXES. An illustrated catalog sheet issued by Southwestern Industries, Inc. describes a series of flexible gear boxes for use in actuators, computers and small electronic components.
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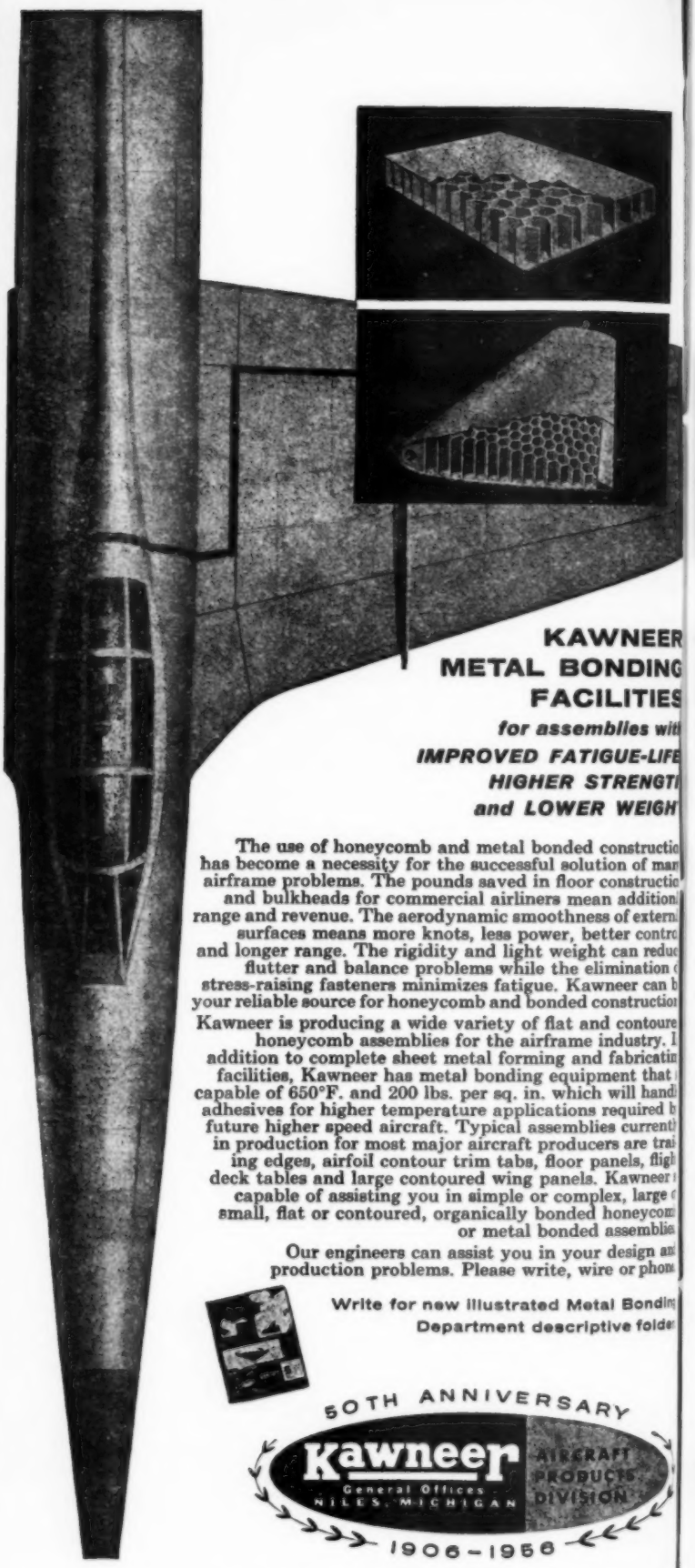
DRAFTING. A 12-page booklet titled "11 Ways to Save Drafting Time" has been issued by Frederick Post Co. Time-saving techniques in the use of intermediate drawings are illustrated.
Circle No. 111 on Reader Service Card.

ENGINEERING BULLETIN. The first issue of the Thompson Products Engineering Bulletin, covering results of research and engineering in the aircraft, electronic, automotive and other fields, has been published by Thompson Products, Inc.
Circle No. 112 on Reader Service Card.

FIRE PROTECTION. Catalog 73 published by the "Automatic" Sprinkler Corp. of America covers various generally accepted methods of fire detection, fire prevention, fire control and fire extinguishment.
Circle No. 113 on Reader Service Card.

SOLVENT DETERGENTS. A 16-page booklet issued by Oakite Products, Inc. tells how solvent detergents remove oily films, smut, compounds and primers from aluminum or synthetic paints from steel.
Circle No. 114 on Reader Service Card.



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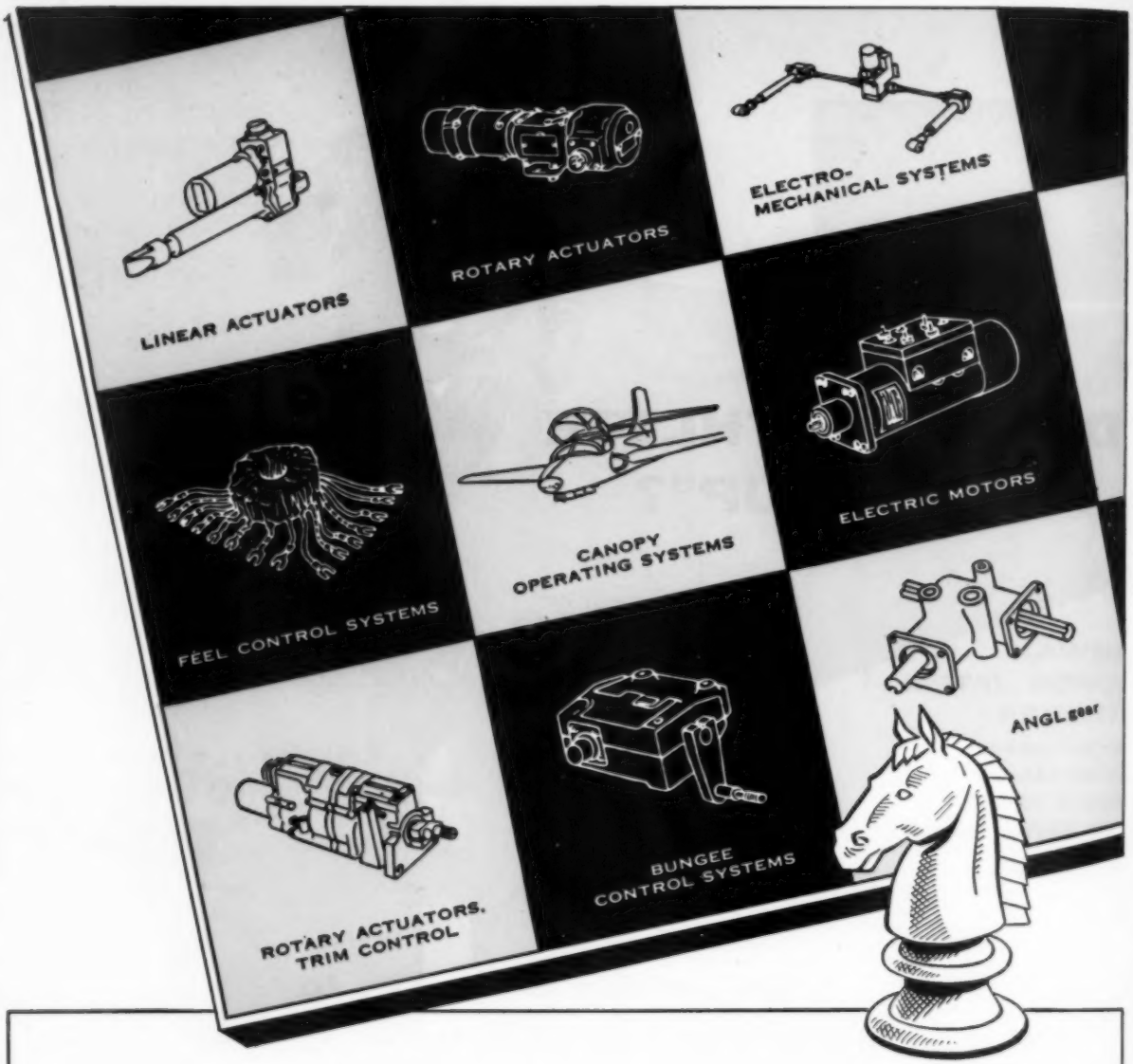

Your move

If you play chess, you know how specialized and versatile the 16 pieces can be. Each has its prescribed function, yet can be employed in endless strategies to effect a checkmate.

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OTHER PUBLICATIONS AND SERVICES

American Aviation Daily: Daily News service for the entire industry. $200 per year. Managing Editor—Keith Saunders.

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Official Airline Guide: Monthly publication of airline schedules, fares, World-Wide Edition: $19.50 per year, everywhere, North American Edition: $13.50 per year in USA; $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert R. Parrish.

Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Mary Miller.

Airports: Weekly newsletter for airport officials suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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Personal View

By WAYNE W. PARRISH

The Jet Age is Wonderful, But—

IT IS A very healthy part of the enterprising American scene that when groups of people have problems they gather together to thrash out the issues and get corrective machinery in motion.

Within one month in Washington there have been two significant conferences to pinpoint the enormous problems created by the jet airplane and the great increase in air traffic of all kinds. First came the jet airport conference called by CAA Administrator Charles Lowen. Then came the two-day jet age conference sponsored by the Air Force Association.

Any outsider who would have had the fortitude to sit through the combined three days of papers and panel discussions could scarcely fail to be impressed by the immense vitality and the wide range of ideas and opinion inherent in this dynamic country. Both conferences evidenced a restlessness to get something done, to improve a rapidly deteriorating situation, and to face up to the problems before they become more critical.

Here was freedom of expression and freedom of thought at its best. The top command of the Air Force did itself proud by its frankness and its obvious willingness to cooperate. The CAA has taken on a fresh and candid approach mixed with a new desire to do something. Organizations representing everything from air defense to airports, airlines, business aircraft and aviation safety, all pitched in with something akin to crusading zeal to spotlight the problems as the first step toward building something new and better.

Only in America could one find such spontaneous leadership. Full credit must go to both CAA and to the Air Force Association for sparking two constructive forums.

The next question is action. Who will carry the ball? There was no escaping the voices from many speakers that the jet age is a *national* problem in every aspect.

It would take a textbook to outline all of the issues and all of the corrective measures in motion, but it isn't difficult to pick out the three problems which were most frequently mentioned.

1. *Air Traffic Control.* It's critical *now*. It will become increasingly more critical. "There is just so much airspace, and no more," it was pointed out by Milton Arnold, v.p. of the Air Transport Association. "It should be looked upon as a natural resource like gas, water or petroleum. Poor planning or extravagance in its use can destroy its utility and lose a battle for us every day.

"I submit," General Arnold said, "that the problem of our vanishing airspace is so serious that the public, the Congress and the executive branch of the government have not fully begun to appreciate it. I submit that it is so serious that even many of the aviation experts in this room have not understood the full threat it represents." The solution? A completely new and completely revolutionary method for controlling air traffic. Many starts have been made. Even SAGE could be well adapted. It is high time to move ahead.

2. *Noise.* A growing problem which will be heightened when commercial jets arrive. Many corrective steps are being taken but at best they will only alleviate, not eradicate, the noise nuisance. "Noise is just something we are going to have to live with," was the candid comment by USAF Chief of Staff General Nathan F. Twining. "The American people will eventually understand this. In fifty years we have learned to live with the stench, noise, expense, death and destruction of the automobile. I doubt that noise will cause the destruction in a hundred years that the automobile does in one."

The military is progressing in its program of moving its bases as far from built-up areas as practicable, but commercial airports cannot be so far away. Much more jet noise is coming—much more. Every technical step possible will have to be taken but the other alternative is educating the public. "We're going to have to live with it."

3. *Airports.* With a $3 billion investment by the public in airports today, almost every community in the nation hoping to get jet service is faced with more tax burdens for longer runways and strengthening runways. There isn't an airport in the nation fully equipped from all angles for jet traffic. The resistance to further taxes is growing. The Airport Operators Council has taken the lead in stating the position of cities that there is a limit to expansion of airports. It is a tremendous problem requiring the best brains of industry and both federal and local governments.

And so with those three highlights out of a multitude of other issues and ideas resulting from the two conferences, it would appear logical that the only sensible solution to gearing up the nation for jets and increasing traffic is for the White House to adopt the recommendation made recently by the Aviation Facilities Study Group for the appointment of a competent leading civilian to head up a genuine over-all civil-military study leading to practical action. The problems are beyond the range and scope of any single government agency or any organization. They are national and they must be solved through national direction. The sooner they get high-level attention the better.

U.S. TRAINS WORLD'S BEST JET PILOTS AT LOWEST POSSIBLE COST

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Hailed as the world's safest jet trainer, the Navy's T2V-1 SeaStar was built in only 135 working days from start of structural work to roll-out—another Lockheed production record! And because Lockheed has the T2V-1 production line in being, all branches of the U.S. armed services are assured of being able to get the latest and the best jet trainers in the shortest time—modified to suit the special requirements of each.

U.S. Navy T2V-1 SeaStar Jet Trainer

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When & Where

Feb. 16-17—IRE-AIEE-University of Pennsylvania Conference on Transistor Circuits, Philadelphia.

Feb. 21-23—Air Transport Association reservation committee, St. Charles Hotel, New Orleans.

Mar. 6-8—Air Line Pilots Association Fourth Annual Safety Forum, Chicago.

Mar. 6-8—Air Transport Association Ticketing and Baggaging Committee, Ambassador Hotel, Los Angeles.

Mar. 7—IATA North Atlantic off-season fares policy group meeting, Switzerland.

Mar. 14-16—American Society of Mechanical Engineers, aviation division conference, Hotel Statler, Los Angeles.

Mar. 19-21—Society of Automotive Engineers, National Production meeting and forum, Hotel Statler, Cleveland.

Mar. 19-22—Institute of Radio Engineers National Convention and Radio Engineering Show, New York.

Apr. 5-6—IRE-AIEE-ISA Conference on Magnetic Amplifiers, Syracuse, N. Y.

Apr. 9—IATA Atlantic commodity rates board, New York.

April 9-12—Society of Automotive Engineers, National aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statler, New York.

Apr. 11-13—Seventh Regional Technical Conference and Trade Show, IRE, Hotel Utah, Salt Lake City.

Apr. 22-26—Twenty-ninth convention American Association of Airport Executives, Hotel Carter, Cleveland.

Apr. 23-24—New England Radio Engineering Meeting, Sheraton Plaza Hotel, Boston.

April 30-May 4—Fifteenth National Conference, Society of Aeronautical Weight Engineers, El Cortez Hotel, San Diego, Calif.

May 1-3—Electronic Components Symposium, sponsored by IRE, ALEE, RETMA, WCEMA, NBS, Departments of Defense and Commerce, Department of Interior Auditorium, Washington, D. C.

May 2—Fourteenth annual conference Society of Aeronautical Weight Engineers, Ft. Worth.

May 2-5—American Helicopter Society, 12th Annual National Forum, Sheraton-Park Hotel, Washington, D. C.

May 3-4—Sixth annual IAS West Coast Student Conference, Los Angeles.

May 6-9—Second National Flight Test Instrumentation Symposium, Ft. Worth, Tex.

May 14-15—National Aeronautical and Navigational Conference, Hotel Biltmore, Dayton, Ohio.

May 24-26—Tenth annual convention of Armed Forces Communications and Electronics Association, Statler Hotel, Boston.

May 27-June 3—Annual Convention, Aviation Writers Association, San Francisco.

June 3-8—Summer meeting Society of Automotive Engineers, Hotel Chalfonte, Atlantic City.

June 6-8—American Society for Quality Control, Palais Du Commerce, Montreal, Canada.

June 17-21—Semiannual meeting American Society of Mechanical Engineers, Hotel Statler, Cleveland.

June 19—Tenth session of International Civil Aviation Organization Assembly, Caracas, Venezuela.

June 20-22—Twenty-seventh meeting Aviation Distributors and Manufacturers Association, Grove Park Inn, Asheville, N. C.

Sept. 25-29—International Association of Aircraft Constructors, jet transport conference, The Hague, Netherlands.

Nov. 26-30—Third International Automation Exposition, Trade Show Building, New York City.

Letters

Ideas Must Be Pushed

To the Editor:

Reference—December 19 issue AMERICAN AVIATION under the caption "Ideas Wanted."

I don't believe that it was necessary for the writer to withhold his name. Though the law of self-preservation is strong, even though you work for United Air Lines where, at least up to the time I left their employ (1926-1943), the good old Suggestion System was always a good payoff way of getting constructive gripes off your chest and at the same time getting past the "gaffer" who consistently rejected new ideas. (I helped reorganize United's Suggestion System, and still have Pat's letter asking me to help revive it and put it on a going basis.)

Being very aware of the airlines' need for up-to-date baggage and cargo handling equipment, I constantly run into those "unreconstructed rebels" who, when I show them our KeyLIFT truck (AMERICAN AVIATION, Nov. 7, 1955) just have to resist it, even though, as the Chief Engineer of a major airline said when he looked at it, "Golly, Van, you fellows have built this right from the ground up and for a specific purpose." Then you hear "it costs too much" (sells under $6,000), but an airline will spend $75,000 to repair their nationwide fleet of 1946 obsolete rolling stock and as one chap remarked when I asked him about that, "Well, it will last another year or so," (shades of Jet transport).

Then when the president and executive vice president of Southwest Airways walk out on the ramp at San Francisco in a torrential rain, where I was demonstrating the KeyLIFT, observe test loading and then place an order for KeyLIFTS (Nov. 17, 1955), you realize that when an airline has a problem, there are those executives who recognize it right away and do something about it.

When MATS flew a C-124 to Los Angeles Airport to transport me and the KeyLIFT unit to McCord Air Force Base for a cold weather test, we must have something!

Keep it up, "Ideas," you're barking up the right tree.

E. VAN VECHTEN
Manager, Keystone Products
Keystone Engineering Co.
Los Angeles.

Expert Opinion on Scotch

To the Editor:

I read with some amusement your recent comments in AA as regards "lousy Scotch." Having spent considerable time both in England and on the Continent, and having also wondered about the quality of the booze, I am inclined to express some answers and opinions.

The reason for the inferior brew in England has to do with their post-war efforts to bolster their economy by encouraging exports and discouraging domestic consumption. The heavier fractions (which are, of course, less expensive) are what one would get in the average British pub. The lighter fractions are reserved for export. As a suggestion, it is best to stick to brands which are not popular on the export market. These off-brand makers do not engage in export and, while their stuff is still somewhat heavier than we get there, it is better than the popular brands.

As to the inferiority of Continental whiskey, the stuff is watered. The Continental may be a connoiseur of wines but *he don't know from nuthin* when it comes to whiskey and it is easy for the proprietor to water it without arousing suspicion. Also the Continental proprietor doesn't have to worry about being checked on. It never happens. As a further suggestion, stick to Cognac on the Continent. It is cheaper, and not too bad if you don't drink too much of it in one sitting.

One other comment I would like to make has to do with this business of ice in Scotch. As far as I'm concerned, ice serves the same purpose as the water used so profitably by the French pub-keepers. Scotch is probably the only whiskey which has a real taste of its own and, as far as I'm concerned, doesn't mix with anything. I'll take mine straight in sips rather than in "gulps with chaser."

I don't know a thing about the Guy Lussac business except that Guy Lussac was a French scientist who discovered something or other about the expansion of gas.

JOHN SHELDRICK
26645 Lyndon Rd.
Detroit 39, Michigan

We're Happy Too

To the Editor:

It afforded me considerable pleasure to read your article in the December 19 issue of AMERICAN AVIATION concerning the crash repair activities of our subsidiary, Lockheed Aircraft Service-International, Inc.

Aircraft crash repair work throughout the world represents one of the fascinating phases of this business; and it is gratifying indeed to read articles describing some of the work in which we are engaged.

J. KENNETH HULL
President
Lockheed Aircraft Service, Inc.
Burbank, Calif.

The Luggage Problem

To the Editor:

I have just read Gen. McMullen's letter in the December 5 issue of AMERICAN AVIATION.

There is absolutely no argument with his sentiments in that the industry does have a problem in handling passengers' baggage. I must admit, however, that the overwhelming majority of passengers' baggage arrives at its destination as anticipated—intact and without delay in delivery.

The "gettable" baggage feature he suggests is here. Braniff passengers, as well as those of other operators of the Super Convair 340, have been enjoying this additional convenience for quite some time. The illustrations in Convair's booklet (on the Super 340) fully describe the location and size of our "carry-on" baggage compartment . . . Of course, the baggage must be weighed and manifested prior to boarding the aircraft.

JOSEPH D. STANICK
Manager Passenger Relations
Braniff Airways Inc.
Dallas, Tex.

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Industry News Digest

Jet Age Meeting Hears Experts Differ On Traffic Control, Noise Solutions

Both the military and commercial operators are convinced that the acutely pressing problem of congested airlanes can be solved, but there's a wide difference of opinion as to whether the equally critical jet noise difficulty can be overcome.

This sums up the conclusions reached at the Air Force Association's Jet Age Conference in Washington last week. More than 1,500 representatives of the military services, airlines, manufacturers, government and private flying attended.

On noise, the military's attitude was expressed by Gen. Nathan F. Twining, Air Force Chief of Staff, who said: "We ain't heard nothing yet." He pointed out that all of the AF's present complaints about noise have come from the use of engines delivering 4,000-8,000 pounds of thrust.

• **"What will be** the effect of jet noise," he asked, "from engines of 12, 16, 20, 25 thousand pounds of thrust? What will be the effect of hundreds of jet airliners operating in and out of population centers?"

Twining declared the military services use "time-consuming, fuel-wasting and tactically inefficient traffic patterns both for take-offs and landings" but added it is doubtful whether airlines, which operate on tight cost margins, can afford patterns that will avoid populated areas.

"The end answer is acceptance," he said. "We must not only pre-condition communities, we must pre-condition the nation."

But at a subsequent symposium on noise, William Littlewood, v.p. for equipment research for American Airlines, said education of the public is a limited approach. "The only possible solution," Littlewood declared, "is the reduction of noise at the source," i.e., the jet engine.

C. E. Rosendahl, executive director of the National Air Transport Coordinating Committee, said noise suppressors are on the way and the jetliner builders are hopeful that their planes will be no more noisy than existing transports using piston engines and propellers. In addition, Rosendahl said, afterburners are the really big noisemakers and no airline has yet suggested putting afterburners on jet engines for commercial use.

• **On the other hand,** the Air Research and Development Command's Dr. H. O. Parrack declared the military cannot be as optimistic about noise reduction as the commercial operators. The airlines, he said, can probably accept loss of performance better than the military, possibly by trading beefed-up structures for noise-suppressing nozzles.

On air traffic control, AFA speakers generally agreed that present CAA techniques will be inadequate to handle increasing jet operations, and that some radically new solutions will be necessary. But there was not so much agreement about the solutions themselves.

• **Maj. Gen. Kenneth P. Bergquist,** USAF director of operations, called for positive all-weather control of aircraft above 24,000 feet in certain high-density areas, with the lower altitudes left with the present IFR-VFR control arrangements. He also suggested the separation of terminal facilities in certain high density areas, with one terminal reserved for jet operations and another for conventional planes.

His idea represented a retreat by the Air Force from its original demand for an air traffic control system which would provide all-weather, all-altitude control of aircraft, on or off the airways. The earlier demand would, in effect, have required all pilots to master IFR procedures.

Gen. Bergquist recommended greater use of air defense radar for Common System air traffic control for the immediate future, and suggested that the SAGE system for continental air defense may ultimately be employed for air traffic control.

• **Henry W. Boggess,** president of the National Business Aircraft Association, disagreed with the idea that future air traffic should be controlled from the ground. He called for the invention of an airborne electronic box which would permit direct and individual enroute clearance under IFR conditions. Such a device could give a pilot "eyes for IFR vision and even eliminate the traditional VFR blind spots from above, to the rear and below."

Boggess boosted VOR/DME, noting that it is available today, and reasonable in price and dependable in service. "We simply cannot afford to wait 5, 8 or 10 years to see how Tacan will prove out . . . VOR/DME is here now; it is usable; it has been bought and paid for with taxpayers' dollars and with full approval of military and civil aviation and the Congress of the United States."

• **Brig. Gen. Milton W. Arnold,** Vice President for Operations and Engineering, Air Transport Association, urged development of a "completely revolutionary method for controlling air traffic," but he did not specify the elements of such a system.

Clarence N. Sayen, president, Air Line Pilots Association, declared that the present "see and be seen" collision prevention philosophy is obsolete, especially for enroute traffic. He called for bigger airports with multiple runways and omnibus lighting for faster acceptance of aircraft, multiple instrument landing systems and adequate approach lighting.

"We must accept the fact that we must have positive control of all traffic as fast as equipment becomes available."

British Navy Fighter, Vickers Supermarine N 113

First of pre-production batch for Royal Navy development trials, this Vickers Supermarine N 113 twin-Avon transonic fighter features flap blowing and a saw-tooth wing. Capable of operating from carriers and of carrying a tactical nuclear weapon, it made its first flight last month.

Boeing Delivers RB-47K, New AF 'Weather' Jet

Air Force's Strategic Air Command has taken delivery of an undisclosed number of new RB-47K weather reconnaissance and photo aircraft produced by Boeing Airplane Co.'s Wichita Division. RB-47K, shown in maiden flight, features new weather instrumentation in nose panel. Dimensions are identical to RB-47E, including standard complement of six cameras in main compartment.

Management Firm Urged Cut of 3,350 In CAA Personnel, Monroney Reveals

Five recommendations that would result in a cut of 3,350 in CAA personnel and an overall $18-million reduction in salaries have been made by a firm of management consultants, it was revealed last week.

The controversial Cresap, McCormick & Paget survey of CAA was made public by Sen. A. S. Mike Monroney as his Senate aviation subcommittee continued its investigation of the agency. Strong objections to the release were registered by Louis Rothschild, Under Secretary of Commerce for Transportation.

Net saving from the five recommendations would be 2,250 employes and $13 million annual payroll because of some transfers within the Commerce Dept., the survey showed. The recommendations called for:

• **Transfer** of fiscal and compliance aspects of the Federal Aid-to-Airports program to the Bureau of Public Roads; dissolution of the Office of Airports and creation of a planning division within the Office of Federal Airways, since such activity "detracts from the primary responsibility of CAA for air traffic control and aviation safety."

• **Elimination** of the Interstate Airways Communications Stations in their present form, with weather activities transferred to the Weather Bureau and air-ground communications consolidated with or remoted to other operation facilities of CAA.

• **Changing** the basic concept of CAA IFR traffic control by establishing a three-dimensional concept and consolidating the 26 air route traffic control centers with 50 airport towers, thereby forming 50 major terminal areas.

• **Restriction** of CAA safety activities to the establishment of basic standards, supported by surveillance of various segments of the industry and transferring basic responsibilities for certification and compliance to the industry itself.

• **Changing** the basic plan of organization from a regional administrative concept to a centralized, functional system with the Administrator appointing a Deputy and delegating sole responsibility to the heads of Airways and Safety for all activities within the two major areas of CAA operation. A regional type organization would be set up within the organization of the Office of Federal Airways.

Transportation Under Secretary Louis S. Rothschild, who had opposed the release of CMP recommendations, indicated nine sections of the report had been adopted. Though they were announced when effected, it was never indicated that the actions resulted from the management report. Included: consolidation of airway planning staffs; high density air traffic zone experiment in the Washington, D. C. area; reestablishment of the post of Deputy Administrator; combining and remoting of INSACS; and delegation of responsibility to industry with legislation now being prepared.

Frye Mockup Near Completion

The Frye F-1 utility transport's cabin mockup will be completed by Feb. 15, according to Jack Frye. His company is aiming for Apr. 1 as possible starting date for building the prototype and beginning of production. Negotiations are under way with several manufacturers.

Gardner Submits Resignation in Row Over Missile Plans

Trevor Gardner, Assistant Secretary of the Air Force (Research and Development), last week submitted his resignation in a dispute over money for the missile program. At presstime, no action had been taken on the resignation.

Gardner, who has disagreed on many occasions with his Pentagon superiors on the size of the research and development funds, was said to be ready to leave his job and take his case to the public unless appropriations were boosted.

Pentagon sources said a strong letter of resignation was submitted by Gardner to AF Secretary Donald Quarles, but that it was not accepted. Gardner then left for Florida to confer with Defense Secretary Wilson.

Last August, Gardner asked for an additional $100 million to exploit recent breakthroughs in secret military research. Some money was made available, although not as much as he asked.

There were also reports that Gardner was irked at not being named special assistant to Wilson for guided missiles. Speculation was that he had not been offered the post because of the possibility that he may come under attack in Congress on conflict-of-interest grounds (government officials are forbidden to participate in private business firms which deal with the government).

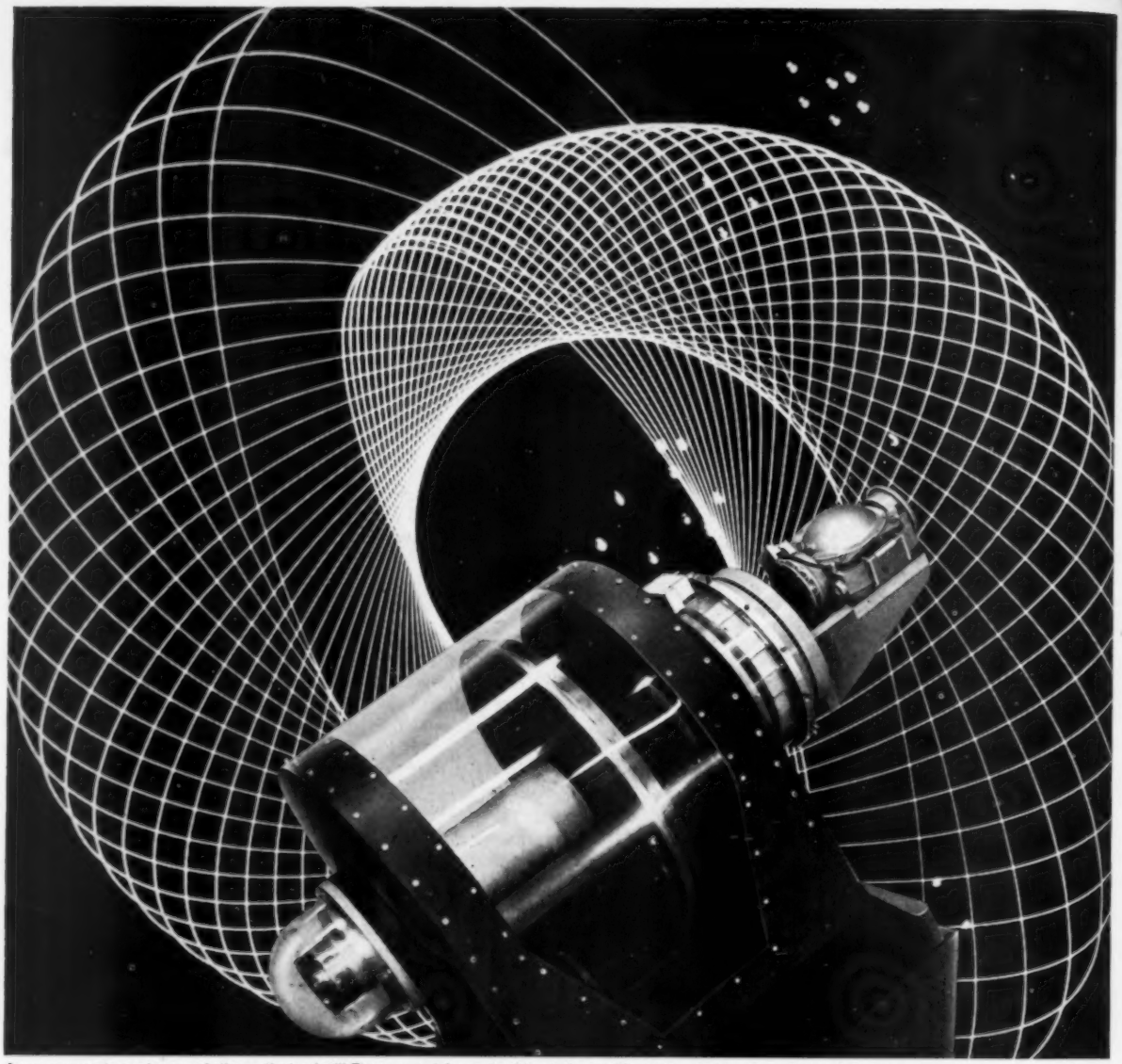
AIA Export Conference Put Off; Chairman Quits

The chairman of Aircraft Industries Association's export committee has resigned in protest over cancellation of an AIA export conference.

R. B. Swanson, Convair's Washington representative, quit as chairman when AIA president DeWitt C. Ramsey ordered the conference called off because he said the plans required further study by AIA.

The meeting, scheduled for Feb. 23-24 in Miami Beach, was intended to boost U.S. aircraft exports to Latin America. It was to cover civil and military requirements for aircraft, equipment and installations. Invitations had been extended to speakers and hotel arrangements had been made.

An AIA spokesman said the conference was postponed, not canceled. Ramsey and the executive committee felt it deserved attention of the two



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regional manufacturers' councils, which do not meet until March, he said, adding that the export group was asked to postpone the meeting until later. Why postponement came after plans had progressed so far was not explained.

Large attendance of U.S. and Latin American air attaches, manufacturing and airline officials was expected. Speakers were to include Secretary of Commerce Weeks; CAA Administrator Lowen; CAB Member Denny; Lt. Gen. C. S. Irvine, USAF Deputy Chief of Staff (materiel); Sen. Stuart Symington; Roy Hurley, president of Curtiss-Wright Corp.; Mundy I. Peale, president of Republic Aviation, and Ruben Berta, president of VARIG, Brazilian airline.

Cessna Tests Special BLC Helicopter

First successful flight of a boundary layer control-equipped helicopter, accomplished last June, has been officially announced by the Cessna Aircraft Co. Although performance details are classified, it has been revealed that the test system is aimed at delaying the onset of retreating-blade stall, the major barrier to higher forward speeds for helicopters.

The flight culminated a three-year research program by Cessna under the joint sponsorship of the Naval Research Air Branch and the Army Transportation Corps.

Tests are being conducted on a specially modified version of the Cessna CH-1 helicopter, powered by a 265-hp Continental engine and equipped with specially developed hollow metal rotor blades built under subcontract to Prewitt Aircraft Co.

Basis of the BLC system is an air pump which serves as an exhauster, sucking the air into the blades through slots on the upper blade surfaces, through the blade interior to the hub, where a combination cycling valve and transfer chamber permits entrance of the air into the BLC air pump. Exhausted air is then vented overboard on the left side just aft of the cabin.

Hughes Orders Eight Boeing 707s for TWA

Trans World Airlines became the latest carrier in line for jet transports as Howard Hughes announced that Hughes Tool Co. had ordered eight Boeing 707-120s for delivery to TWA. The jetliners, which cost about $4.5 million each, will be delivered between April and August, 1959.

Hughes said a total of 30 jet transports would be ordered for TWA during the next few months and that discussions are being held with Boeing for additional planes.

Increase from 20 to 23 in National Airlines' order for Lockheed Electra turboprop transports, and purchase of five Convair 440 Metropolitans by Iberia, Spanish airline, have also been announced. Iberia contract is worth over $4 million and raises Convair's 440 sales to 74. First 440 came off the assembly line in early February.

Bristol to Develop 500 MPH Turboprop

Bristol and General Dynamics Corporation officials met in New York last week to discuss the future of the "three-nation" 500-mph turboprop transport project. They decided that for the time being Bristol should go ahead with the design and development of the aircraft to be known as the Bristol 187, in the United Kingdom.

Meanwhile, Canadair Ltd. is likely to build a transport version of the marine reconnaissance version of the Britannia that it is producing in Montreal for the Royal Canadian Air Force. Cooperation between Bristol, Canadair and Convair will continue but it seems unlikely that the 130-passenger BE 25-powered Bristol 187 will be produced in North America.

Boeing Lists Specs For 707 Models

Boeing Airplane Co. has clarified previous performance estimates for its three 707 transport versions with recent announcement of these firm specifications:

707-120—Gross weight—225,000 lbs.; payload—31,000 lbs.; cruise speed—591 mph; fuel capacity—17,400 gals.

707-220—Gross weight—250,000 lbs.; payload—31,000 lbs.; cruise speed—605 mph; fuel capacity—18,078 gals.

707-320—Gross weight—280,000 lbs.; payload—38,000 lbs.; cruise speed—600 mph; fuel capacity—23,580 gals.

CAB Rejects IATA's Proposed Fare Increase

Civil Aeronautics Board has refused to approve a 10% increase in first class fares in many areas; including Atlantic and Pacific crossings, which airline members of the International Air Transport Association planned to make effective April 1.

Also, the Board expressed dissatisfaction at the "high level" of current IATA tourist fares. The agency limited its approval of those fares to Dec. 31, 1956, and called for "a re-examination of the overall fare structure" in the meantime.

Adel's New Sales Manager

Donald K. Marsh, former aircraft sales manager of General Controls Co., has been named sales manager of Adel Precision Products, a division of General Metals Corp., Burbank, Calif. Marsh has also been with Teleflex Inc. as sales engineer and was field engineer for the Propeller Division of Curtiss-Wright Corp.

Symington Says Reds Lead U. S. in Missiles

The Russians are ahead of the U.S. in the ballistic missile field, Sen. Stuart Symington (D., Mo.) declared without qualification on a television program last week. The former AF Secretary reported the Soviets have fired a ballistic missile "hundreds of miles" farther than any comparable U. S. model.

Indicating that he will urge a Senate investigation, the Missouri Democrat attributed America's lag in the missile race to the fact that "the most important missile we have is being operated on a five-day week." Symington also charged that the U.S. is not turning out enough B-52 jet bombers.

Piasecki Helicopter Corp. Now Vertol Aircraft

Directors of Piasecki Helicopter Corp. have unanimously voted to change the Morton, Pa., company's name to Vertol Aircraft Corp. and a special stockholders' meeting will be called to approve it. Name change was necessitated when founder Frank N. Piasecki set up Piasecki Aircraft Corp. in Philadelphia.

AIA Helicopter Council Elects Berlin President

Don R. Berlin, chairman and president of Piasecki Helicopter Corp., has been elected 1956 chairman of Aircraft Industries Association's Helicopter Council. He succeeds Stanley Hiller, of Hiller Helicopters. Jack Leonard, Cessna's military sales manager for helicopters, was named to the recreated post of vice chairman.

F-100D Has New Autopilot

North American Aviation's F-100D fighter-bomber, which made its first flight this month, is fitted with Minneapolis-Honeywell's new autopilot, described as the first such system for supersonic jets and the forerunner of completely automatic flight. The newest model of the Super Sabre is also equipped for in-flight refueling.

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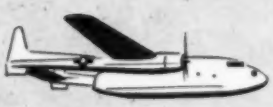

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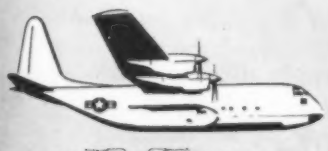

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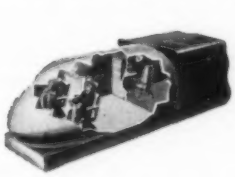

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One of the greatest single factors in improving safety, and at the same time saving literally millions of airline and military dollars, is the growing worldwide acceptance and demand for Electronic Flight Simulators developed by Curtiss-Wright. It costs approximately $400 to keep a four-engine aircraft aloft for an hour. But for less than $30 per hour, pilots and crews can "fly" the Electronic Simulator built by Curtiss-Wright—gaining experience identical to actual flight — without ever leaving the ground — releasing multi-million dollar equipment for earning, not learning. U.S. Air Force studies show that at a single training base, over $4,000,000 per year is saved by Simulators.

A Simulator is constructed around the actual crew compartment of the aircraft it represents, complete with all instruments and controls. The physical resemblance stops here . . . but not the realism. The Simulator — a complex arrangement of analog computers that actuate, through servomechanisms, all controls and instruments — faithfully reproduces the flight characteristics, the engine and aircraft sounds of the prototype. For all practical purposes the pilot is flying. The feel of flying is in the response of his controls. His instruments are in action. A "trouble" console can present him with problems he might not encounter in months of actual experience — ice, snow, sleet, malfunction of equipment, turbulence. Varying sounds warn him of trouble. Red lights tell him of danger.

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AIRTRENDS

Washington, D. C., Feb. 13, 1956

DEFENSE OFFICIALS STILL INSIST that fiscal 1957 budget requests are adequate to insure U.S. missile lead, despite submitted resignation of AF research boss Trevor Gardner over size of missile appropriations. But they don't seem quite as confident about the lead over the Russians as they were a few months ago. Intelligence reports apparently indicate Reds have made unexpected progress in ballistic missile field.

Pentagon evidently plans to bow to Congressional demands in some instances where cost will be small. Proposed naming of a guided missile czar is an example. But efforts of Democrats to raise military appropriations will be resisted.

Here's missile spending picture for first five months of fiscal 1956: $364.5 million spent, $2.8 billion unexpended balance. In addition, the three services placed $283.9 million in missile orders, had $1.5 billion still unobligated.

MANUFACTURING EXECUTIVES fear upcoming Congressional hearings on aircraft profits may be used for political purposes in an election year. They're convinced they have a good case: profits after taxes have been between 2% and 4% on sales since Korea. Rep. F. Edward Hebert's Armed Services investigation subcommittee opens hearings this week.

TREND IS TOWARD LIGHTWEIGHT JET ENGINES. This may dictate use of multiple powerplants in future fighters.

Both Air Force and Navy are interested in program to get more thrust per pound of weight. They're sponsoring General Electric J79 and T58, Westinghouse J54, plus 2,000-pound-thrust engines being developed by Fairchild and GE.

EARTH SATELLITE will provide military with much more data than was indicated when White House first announced the program. It's scheduled for launching within 18 months after July 1, 1957.

Project Vanguard will help solve problems in developing an intercontinental ballistic missile. It may also be forerunner of a reconnaissance satellite. Martin, General Electric, Aerojet-General are involved in the project.

Air Force has indicated long-range interest in "Big Brother"—satellite capable of transmitting TV images of entire earth, thus revealing Russian defense activities.

ATOMIC WEAPONS WILL SOON BE STORED at Air Force bases and carried aboard planes. Nuclear warheads on missiles, plus atom and hydrogen bombs have long been considered an integral part of future air operations. But past missions have generally simulated their use. Now the real thing will be available.

BUSINESS FLYING CONTINUES TO BOOM. Delivery of small twin-engine transports, seating four to nine, jumped more than 125% last year. Beech, Cessna, Piper and Aero Design & Engineering shipped 808 twins against 354 in 1954. Total light planes delivered reached 4,434, worth $91 million retail. This is up 57% from 1954's 3,071, worth $58 million.

Hours flown by business users totalled 4.3 million, out of 9.5 million for all general aviation. Latter figure was 537,000 hours more than previous year. And business flying accounted for 425,000 hours of the increase.

THERE'S A LESSON TO BE LEARNED by aeronautical engineering societies: "open" technical sessions on guided missiles have little value. Reason: unrealistic security restrictions. Recent Institute of the Aeronautical Sciences' missile program failed completely. Over 400 engineers learned nothing from three-hour meeting.

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Production Spotlight

• Military orders for aluminum chips (chaff), normally used to foil enemy radar, have been dropping sharply in recent months, meaning either that stockpiles are considered adequate or that newer and better electronic countermeasures have been developed.

• Loss of the Piasecki YH-16A may pave the way for a speed-up in development of the company's turbo-rotor YH-16B, presently scheduled to fly in about a year.

• Organization being set up at Redstone Arsenal to develop an Army-Navy 1,500-mile range weapon has been named the Army Ballistic Missiles Agency. ABMA came into existence Feb. 1.

• First official admission of increased research activity toward use of powdered metal or "slurry" fuels for high-performance jets appears in National Advisory Committee for Aeronautics' 1955 annual report. NACA reports greater emphasis being directed toward three new fuels, naming aluminum metal along with two chemical types, alkylsilanes and alkyldiphenylmethanes. General feeling has been that, for turbojets, use of powdered metal fuels would have to be confined to afterburners. However, in some NACA tests involving combustion experiments with metal fuels, aluminum has been injected in both powder and wire form into two-inch diameter ramjet combustors.

• Sikorsky Aircraft's new donut-type flotation gear for S-55 helicopters has received CAA approval, opening the door for its use in commercial operations. System consists of an inflatable bag rigged to each of S-55's four wheels involving an overall weight penalty of 150 pounds. Bags are inflated in five seconds, require 15 minutes for deflating and folding by a crew of two after use. Donut gear will be fitted to S-55s recently ordered by Grumman Aircraft and the Argentine Air Force.

• Sncaso is working on a VTO version of its rocket-plus-jet Trident fighter—the Super Trident. Company also has a Super Vautour project using two Bristol Olympus engines.

• Britain has decided to cut production of the Hawker Hunter as part of an overall program to reduce defense spending. It also reports that under this policy the Short Seamew anti-submarine aircraft is being abandoned and the Vickers Valiant jet bomber program curtailed.

• CAA engineering staff, now faced with a record workload involving six major U.S. and 18 foreign aircraft certification projects, currently lists over 20 vacancies. Biggest problem in filling them is monetary. Top starting salary CAA can offer is in the neighborhood of $9,000—for an experienced aeronautical engineer.

• The Handley Page Herald was damaged when it overshot Reading airfield last month while demonstrating to Mohawk Airlines officials. The nose, fuselage and landing gear were damaged.

• Italian Air Force seems to have decided to use the North American T-6 until 1960 instead of buying the various replacement projects which have been worked up by the Italian industry. An Italian firm may be licensed to build T-6 parts to keep the veteran North American trainers flying.

• Beech Aircraft's jet conversion of its T-34A trainer has been named the Model 73 Jet Mentor. Company-financed jet, powered by a Continental J65-T-9, logged 45 hours flight time during first 30 days of operation.

• Examples of current high price of airplanes: Resort Airlines paid North American Airlines $630,000 for a DC-4, with cargo interior; Maritime Central Airways paid Civil Air Transport, Inc. $125,000 for a cargo C-47.

• Scottish Aviation's first Twin Pioneer should be certificated in Britain by the end of March. The second aircraft is nearly ready for flight while the third fuselage is complete.

• France's little-known Max Holste company has an ambitious production program for its Broussard light transport involving the construction of 215 aircraft. At present it is building two a month but will step up to ten a month by year's end.

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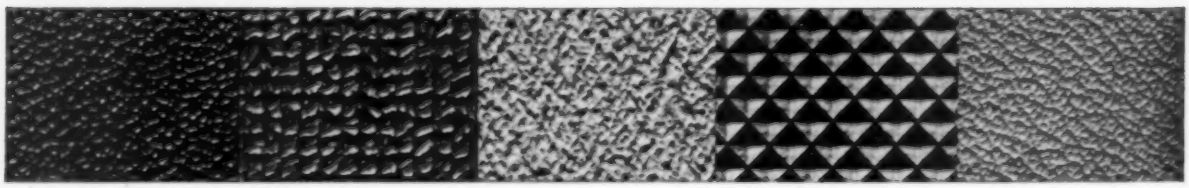

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New Reports of Red Progress Spur U.S. Toward Crash Program in Guided Missiles

Secretary Wilson seeks 'czar' to coordinate developments, as Sen. Jackson calls for 'three-shift, seven-days-a-week' effort on ballistics weapons.

By ROBERT M. LOEBELSON

The big defense news in Congress and the Pentagon last week was the ballistic guided missile, both the American and the Russian versions.

• Defense Secretary Charles E. Wilson announced he is looking for a Special Assistant for Guided Missiles to coordinate that work, especially in the ballistic field.

• Sen. Henry M. Jackson (D., Wash.) called for a "three-shift, seven days-a-week" effort on the ballistic weapons, warning that the Soviets may fire a 1,500-mile missile before 1956 is over.

The Pentagon is now monitoring work on two intercontinental ballistic missiles (ICBMs) and two intermediate 1,500-mile range ballistic missiles (IRBMs), including:

• **Atlas**—a Convair/Ramo-Wooldridge weapon with a range of 5,000 miles which utilizes four huge rocket engines.

• **WS-107**—a Martin ICBM with the same function as Atlas.

• **Unnamed Douglas IRBM** sponsored by the USAF.

• **Advanced Redstone**—an IRBM outgrowth of the 200-300-mile-range Army Redstone ballistic missile developed by German and U.S. scientists at Huntsville, Ala. This work is being done jointly by the Army and Navy.

The acceleration being called for by several members of Congress and the Defense Department's recent action in stepping up ballistic missile work apparently is the result of new intelligence reports indicating that the Russians are making unexpected progress in the field.

Sen. Jackson made a request on the Senate floor for "wartime urgency" to be given to the ballistic program and urged Wilson to name a civilian administrator to give the program top-level guidance.

"All the resources of the Soviet Union and its satellites are now directed toward the objective of seizing our trump card of scientific and industrial supremacy, as symbolized in the race for the ballistic missile," he said.

• **The Washington Democrat** drew praise for his speech from such Democratic colleagues as Gore of Tennessee, Stennis of Mississippi, Kennedy of Massachusetts, Monroney of Oklahoma, Anderson of New Mexico and Mansfield of Montana. Sen. Leverett Saltonstall (R., Mass.), ranking minority member of the Armed Services Committee described it as a "thoughtful, constructive discussion."

About two hours after Jackson was calling for a missile 'czar,' Secretary Wilson told newsmen he was seeking such an individual "to assist me in the direction and coordination of activities connected with research, development, engineering and production of guided missiles, particularly ballistic missiles."

Wilson added, "If I can't find the right man, I may have to do it myself or maybe (Deputy Defense Secretary) Reuben Robertson will take it on."

(The post apparently is similar to one held by K. T. Keller, board chairman of Chrysler Corp., between 1950 and 1953. Keller has just retired as Chrysler's chairman, but Pentagon reports indicate he has not been offered the position. Wilson, however, is said to be seeking someone with the national reputation of Roger Kyes, former Deputy Secretary; AEC Commissioner Harold S. Vance; Studebaker-Packard chairman Paul Hoffman, etc.)

• **Wilson's announcement** is the latest development in the ballistic missile situation which has been expanding since November. At that time the Joint

Planned Duties of the New Special Assistant to Secretary of Defense for Guided Missiles

(as outlined by Secretary Wilson)

"The purpose of establishing a Special Assistant to the Secretary of Defense for Guided Missiles is to provide me with an additional competent, experienced executive to assist me in the direction and coordination of activities connected with research, development, engineering and production of guided missiles, particularly ballistic missiles.

"In addition to this principal duty, he will act as the Chairman of the OSD Ballistic Missiles Committee. He will also act as my assistant in the necessary contacts with the Assistant Secretaries of Defense for Research and Development, Applications Engineering, Comptroller, Properties and Installations, and Supply and Logistics insofar as any of their activities affect the guided missile programs. He will, therefore, be in a position to utilize appropriate staff activities of those offices as may be applicable to guided missiles and related programs without abrogation of responsibilities assigned to those offices.

"It is further anticipated that the advice of the Special Assistant to the Secretary of Defense for Guided Missiles will be required from time to time by the Armed Forces Policy Council, the Joint Secretaries, the Joint Chiefs of Staff and other agencies of the Department of Defense. This does not modify the statutory responsibilities of any of the agencies of the Department of Defense.

"The Special Assistant to the Secretary of Defense for Guided Missiles, in addition to any special reports that may be necessary, will make regular periodic reports to the Secretary of Defense. He is also charged with the preparation of and presentation to the National Security Council and the President of such reports as may be required of the Department of Defense in regard to guided missiles."

Chiefs of Staff decided to start development of the IRBM and Army Maj. Gen. John B. Medaris was transferred from his post as Assistant Chief of Ordnance to the Redstone (Ala.) Arsenal after visiting President Eisenhower.

When Congress reconvened early in January, Wilson was called before Sen. Richard Russell's Armed Services Committee and Rep. George Mahon's House Appropriations Committee to report on U.S. and Russian progress on ballistic missiles. Democratic members of both congressional groups subsequently expressed concern over Russia's missile activities and the fear that the U.S. efforts might not be enough.

About the same time, Soviet Premier Nikolai Bulganin hinted at the development of transoceanic rocket weapons and set off another scare. But the Pentagon discounted Russian attainment of a true ICBM and indicated Bulganin probably was referring to an IRBM. (The Russians conceivably might have developed an IRBM from submersible-launched V-2s captured from the Germans just after V-E day.)

• **The debate** over whether the Reds are ahead of the U.S. in the missile field will certainly continue even after Wilson's new "vice president" for guided missiles is named. The race for an intercontinental weapon with an atomic warhead is on, and five to eight years will determine whether the free world or the Soviet bloc wins out.

If the Russians attain the ICBM first, they will be in a position to use "ballistic blackmail" to dictate the terms at a new parley at The Summit. If the USAF's Atlas or WS-107 is attained before the Russian model, the U.S. will be buying more time because it will have an additional deterrent to an all-out war. ◆◆◆

Jet Noise Main Problem, Says AOC

Despite airport operators' concern with the critical problems of financing improvements for the jet age (AMERICAN AVIATION, Jan. 30), noise levels of the jet transports are even more important, Airport Operators Council told the recent CAA jet airport meeting.

"We know that turbojet aircraft, in their present configuration, without effective noise-reducing devices, will not be acceptable to the public. We believe that the operation of such aircraft into congested areas could jeopardize the success of any program for the use of turbojets."

Manufacturers' assurances that the noise level of the J57 engines will be similar to that of the present DC-6s and DC-7s brought protests from airport officials. The latter group pointed out that the noise levels of the two transports cannot possibly be assumed to be acceptable. Therefore, little cheer was evident when Douglas and Boeing spokesmen expressed little optimism over bringing the noise level of the J75 down to this comparative decibel area.

• **A Douglas official** observed that manufacturers are near solutions to reduce noise as it is known today. Sizeable reductions would be needed, but may still be higher than the latest piston engine models. He warned that if noise was muzzled too much, thrust would be appreciably affected, but promised that it would be brought down as low as possible within bounds of time and money.

A Boeing representative pointed out that operation of the jets could well determine the end result. He observed that the exposure time would be considerably less with jet aircraft because of the faster rate of climb and elimination of runup at the runway, compared to piston aircraft.

• **Adm. Charles E. Rosendahl**, executive director of the National Air Transport Coordinating Committee, told the jet meeting that the answer lies largely with the manufacturers, but added that he questioned whether anyone could constructively discuss the problem until actual experience is gained. He strongly cautioned against the possible ill-effects of speculation and discussion "not carefully thought out in advance."

A few weeks later, before the Institute of the Aeronautical Sciences meeting, the NATCC head expressed the first optimism, the picture "promising." He had found that "the main efforts in mitigating the compressor whine are aimed at tuning it out, absorbing it in the intake passages, and for ground run-ups deflecting it downward." His "best information" is that engineers believe "that by a combination of methods, it can be accomplished satisfactorily at no severe penalty."

• **The most difficult problem** currently, if severe penalties in weight and drag are to be avoided, is the suppression or control of noise at takeoff and in early flight, Rosendahl said.

He cited the "bypass" engine as utilizing a reduction in gas velocity-reduction method for noise suppression and pointed to "several other schools of thought" which are being pursued for mitigation on a practical basis.

"Fortunately," Rosendahl said, concerning jet noise control on takeoffs and landings, "we still have a cushion of about three years before civil jet transports go into service." But, he warned, "we must not let any of this period of grace slip through our fingers." ◆◆◆

Redstone Missile Model

First photos have been released showing models of Army's Redstone ballistics missile, developed by German and American scientists and built by Chrysler Corp. It is larger than the German V-2, is powered by a North American Aviation liquid rocket engine, has a range of about 200 miles. Lt. Gen. J. M. Gavin, Army R&D chief, is shown inspecting the model.

Helicopter Travel Costs U.S. $49 Per Passenger

For every $7.44 put up by the average passenger traveling on a certificated helicopter line today, the Government puts up $48.99 in subsidy. And, according to the Civil Aeronautics Board's executive director Raymond Sawyer, that's the nutshell answer to why there'll be no expansion of certificated helicopter operations until a suitable helicopter is available.

Nevertheless, Sawyer predicted an unlimited future for helicopter operations with the advent of the jet age, paradoxically enough, providing the impetus for the helicopter age.

Addressing the Helicopter Association of America at San Francisco late last month, the CAB official foresaw such things as jet noise and continued traffic increases bringing on the need for larger airports located farther from downtown areas.

This, in turn, will provide the stimulus for helicopter operations between jet airports and downtown areas.

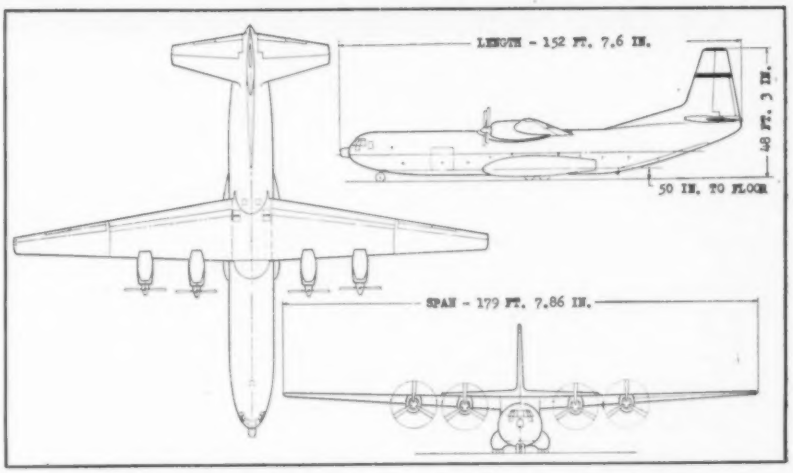
Sawyer also urged that U.S. cities start preparations for that day by providing convenient mid-city heliports.

Douglas Rolls Out C-133 Turboprop

Air Force's newest and biggest turboprop, the 255,000-pound-gross Douglas C-133A cargo transport, was rolled out at Douglas-Long Beach on schedule January 31. It is scheduled to go to Edwards AFB for flight testing in about six weeks.

The C-133A, a 50-000-pound-payload aircraft, is a high-wing design having a span of 179 ft. 7.86 in. and fuselage length of 152 ft. 7.6 in. Fuselage diameter is 16 ft. 2 in. and height at tail exceeds 48 ft.

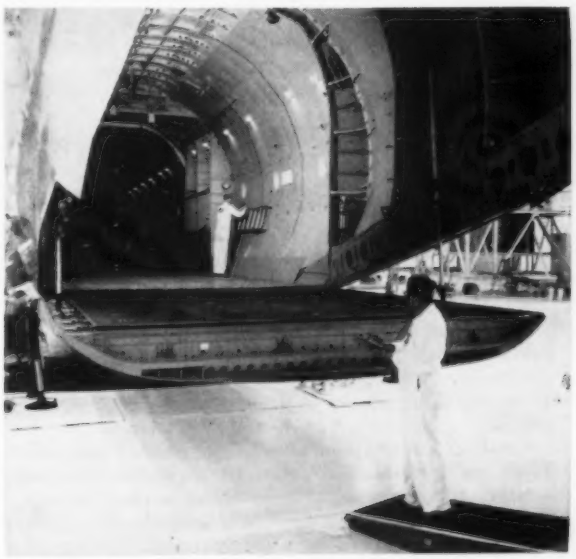
C-133A powerplants are four Pratt & Whitney T34-P3 turboprops rated at 6,000 eshp for takeoff, reportedly producing a cruising speed of about 340 knots and 3,500 mile range. Propellers are 18 ft.-diameter, three-bladed, reversible Curtiss-Wright Turbolectrics.



Three-view diagram shows massive dimensions of new Douglas turboprop.

Giant AF turboprop, Douglas C-133A, is rolled out at Douglas Long Beach plant.

Cargo interior can be converted to carry more than 200 troops.



Tail loading door will accommodate crates 500 in. long, 140 in. wide.

M.I.T. President Urges Establishment Of New Air Policy Commission

A broad plan of action to maintain U.S. supremacy in the face of Soviet technological advances has been proposed by Dr. James R. Killian, Jr., president of Massachusetts Institute of Technology.

As 1956 Honors Night speaker at the Institute of the Aeronautical Sciences 24th annual meeting, Killian called for appointment of a special Presidential commission to chart our technological progress in the years ahead.

"I hope that the means and method can be found to undertake a thorough study of the factors involved in maintaining technological strength and removing the roadblocks to private industry," the M.I.T. president said.

Wide Study Proposed

• **Pointing to the great influence** exerted by the President's Air Policy (Finletter) Commission, Killian proposed that a similar body study and report on such areas as manpower, education and the utilization of manpower, as well as the personnel policies in government, industry or elsewhere that affect its efficient use and conservation.

Killian said the commission should probe for "soft spots" in our research and development and find the answers to such questions as:

• Are there systems areas such as aircraft propulsion where we need more research effort?

• Are there fields such as metallurgy . . . where we need more manpower and more development?

• Is not the whole area of materials one warranting new and more massive effort?

• Is there not now too much loss of time between discovery and application?

• What are the elements of technological strength in the Russian system which holds lessons for us?

• These, he said, are but a few of many questions that could be fruitfully examined in a study of "Survival in the Age of Technological Contest."

• **The proposed commission study** was the key feature of a seven-point plan of action suggested by Killian in marshaling our resources to maintain the technological superiority we now hold. He also called for:

• Emphasis on superior scientists and engineers. "We must seek quality and excellence even at the expense of quantity. . . . Our need is for better science, greater creativity, more advanced engineering, superior weapons."

• More emphasis in our society on the value of hard intellectual labor. "At a time when we are forced to match wits . . . with an alert enemy of growing prowess, America's survival requires that the American people reduce the anti-intellectualism in our schools."

• More attention to long-term objectives. ". . . we need a better balance between basic research and development, between fundamental ideas and hardware, and we are making only slow headway in achieving this better balance." Killian cited a recent National Science Foundation study which shows that only 2.4% of total R&D expenditures in the aircraft industry go for basic research, compared to 4% for all industry and 10.5% for the chemical industry.

• Better protection and enhancement of the status of scientists and engineers in our society. "This is more than a matter of compensation . . . It is a matter of status and relative prestige in the array of professions."

"I am disturbed," Killian added "by the attitude that because a man is a scientist, he is disqualified for . . . policy-making responsibility even though he may have the qualifications."

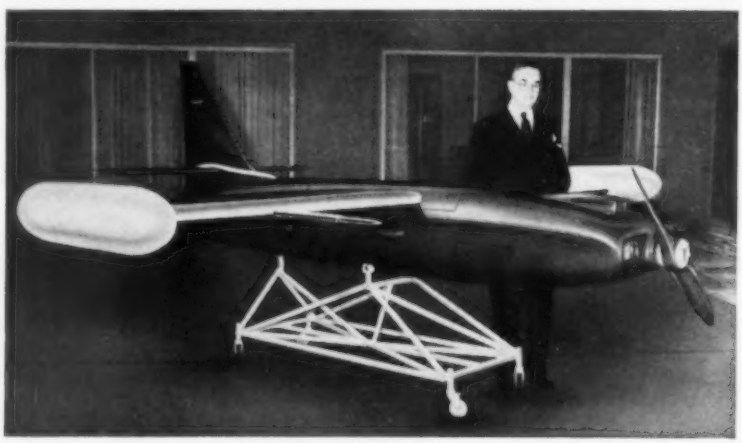
Recommends "Interaction"

• Furtherance of present efforts to increase the Government's access to our national scientific resources by increasing the "interaction" between qualified scientists and government officials responsible for policy or operations affected by technology. Killian says the recent recommendations on R&D of the Hoover Commission "are thoughtfully considered to achieve this objective as well as a strengthening of coordination of scientific activities at the top levels of government."

• Wider recognition by the Government of the special nature of research and development in its contracting and budgetary procedures. "Contractual procedures designed for procurement are hardly ever appropriate for research, and short-term budgets are frequently inadequate for effective research. We need in every possible way to simplify the Government's management of research and development and to expedite its decision-making processes."

• A high priority to efforts to reduce the hampering effects of excessive security. "My industrial friends," concluded Killian, "speak repeatedly of the frustrations of duplicate clearances of their personnel, and of the hampering restrictions on vital communication among cleared personnel, of the energy and creative spirit wasted by security red tape, which retards accomplishment more than it secures." ◆ ◆ ◆

Radio-Controlled Plastic Drone Flies 400 MPH



President Whitley C. Collins inspects new RP-77 radio-controlled plastic drone developed by Radioplane Co. as a company-financed research project. Capable of speeds between 350 and 400 mph in flights ranging from sea level to very high altitudes, the new drone is designed for use principally as a target for ground-to-air and air-to-air gunnery, rocketry and missile training.

It also is easily converted with "bolt-on" equipment for use as a camera plane for battlefield or overwater surveillance, airborne nuclear detection, weather reconnaissance or as a flying test-bed for missile sub-systems. The plastic construction consists of new methods of applying fiber cloth in layers, bonded and reinforced by polyester resins.

Boeing Jet Silencers Near Flight Test

Noise from 707 cut to level of DC-7's piston engines in ground tests; giant strides predicted in air navigation and traffic control.

By JOSEPH S. MURPHY

Boeing Airplane Co. is moving into the flight-test stage with a program that shows good promise of solving aviation's No. 1 problem—jet noise.

First results of tests with a variety of jet exhaust silencers show that noise from its 707 jet transport can be cut to the level of present-day DC-7 piston engine aircraft. Following recent static and high-speed ground tests with full-scale suppressors, the company now plans early flight testing of its prototype jet with some of the more promising designs.

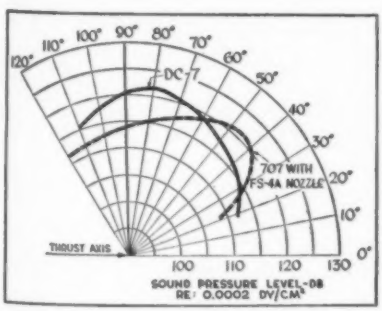
Disclosure of Boeing's success in noise reduction came recently during the Institute of the Aeronautical Sciences' 24th annual meeting in New York.

• **Only six months ago,** staff engineer H. W. Withington told IAS, there appeared little or no hope of silencing the jets with any remotely practical device. Now, after only three months of actual testing of 40 small-scale and seven full-scale suppressors, Boeing has been able to reduce noise levels to the point where jet aircraft might be considerably quieter than today's airline transports.

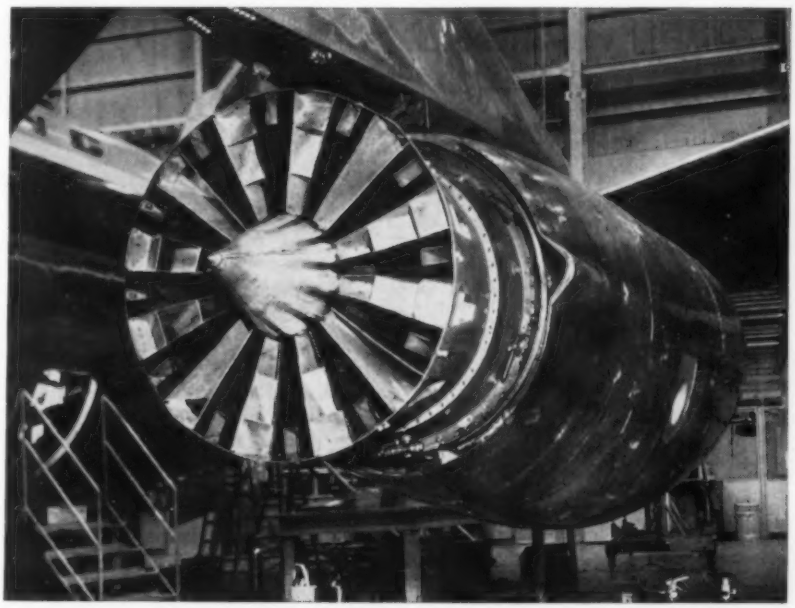
Withington's report highlighted an IAS agenda which included some 82 individual technical presentations. Other key topics of discussion were:

• **Military turboprops**—Lt. Col. R. J. Wellman of USAF headquarters termed the turboprop our only practical choice for improving the nation's civil and military cargo transport system considering cost, speed, economy, flexibility, noise and safety.

• **Air navigation/traffic control**—Air Navigation Development Board's J. L. Anast predicted that giant strides will be forthcoming in improving air navigation and traffic control to cope with the jet age.



Ground runup comparison of Boeing's 707 and Douglas DC-7 with one engine operating at full power.



One jet nozzle suppressor slated for flight testing is 12-corrugation design installed here on Boeing's prototype 707.

• **Crash fire prevention**—U.S. Air Force will soon launch a 300-hour flight reliability program on two Fairchild C-119 transports to evaluate a new crash safety system developed by Walter Kidde & Co. The Kidde system is an outgrowth of crash fire tests conducted by the National Advisory Committee for Aeronautics in 1953.

• **Flight simulator economics**—United Air Lines will soon "risk" ordering an electronic flight simulator for DC-8 training to be delivered before the Douglas jet is built or flown. Training director A. F. Bonnalie expects the simulator to be in operation about a year before the first DC-8 arrives.

Jet Noise Tests

Boeing's jet noise reduction program, discussed by Withington, has been an accelerated four-phase project combining the coordinated efforts of acoustics, power-plant and aerodynamics engineers to come up with the most promising jet nozzle suppressors before embarking on a flight-test program.

Working from a basic "corrugated" jet nozzle unveiled last year by Rolls-Royce, Ltd.'s F. B. Greatrex, Boeing's three-month long investigation has evolved into these major phases:

• Model scale acoustical tests—Using a special laboratory rig, scale model suppressors undergo sound tests on a 3¼-inch-diameter nozzle, 0.141 times a standard J-57 nozzle.

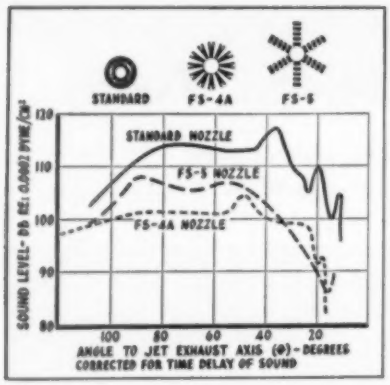
• Model-Scale Thrust Tests—Boeing's standard nozzle test rig has been adapted to check scale model suppressors using a 1.7-inch-diameter nozzle, 0.73 times that of the J-57.

• Full-Scale Thrust Tests—Thrust, fuel flow and engine operating characteristics of several nozzles have been checked in full-scale tests on Boeing's test engine rig.

• Full-Scale 707 Noise Tests—Both static and high-speed taxi tests have been conducted with two nozzles designs installed on the No. 3 engine of the 707 for comparison with a standard J-57 engine nozzle.

Nozzles reaching the full-scale test stage were a six-corrugation design (Model FS-5) and a 12-corrugation arrangement (Model FS-4A), both of which presumably will be further evaluated in forthcoming flight tests.

In this latter phase Boeing also ran comparative noise tests of the 707 (with



Here's how two promising suppressors compare with standard J57 nozzle levels in high-speed taxi tests.

suppressor installed) and a Wright Turbo Compound-powered Douglas DC-7. Results showed approximately equivalent noise levels. Test data (see chart) revealed that both installations produced noise levels approaching 125 decibels at full engine power, differing only in direction of propagation. For the 707, peak intensities were recorded at a 45° angle with the thrust axis, compared to about 80° off-axis for the DC-7.

• **Boeing full-scale tests** showed some promise that jet noise suppressors may be successful in partially "paying their way" for the estimated 100 pounds weight they add per engine over a standard jet conical nozzle. Data showed a 17 to 19 db reduction in the "structurally critical" lower frequencies of 150—1,200 cps, equivalent to that obtained with an engine thrust reduction of 50%.

Withington proposes that this could mean a possible trade of lower wing weight or increased life and lower maintenance in these areas, as experience with both B-47 and B-52 jet bombers has shown that major structural problems exist in wing trailing edges, flaps and ailerons due to acoustical environment.

On comparative 707 and DC-7 take-off noise, the Boeing engineer produced charts showing the area of 100-decibel propagation of the faster-climbing jet to be only about one-half that of the DC-7.

Whereas the 707 reaches a 1,000-ft. climbout altitude less than 20,000 feet (3.8 miles) from start of takeoff with a 100-db noise output, the DC-7 carries this same reading to about 33,000 ft. (6¼ miles).

Similarly, the area of 90 db noise readings for the 707 extend 33,000 ft. from start of takeoff roll, whereas this noise level for the DC-7 prevails to about 80,000 ft. (15 miles) from takeoff roll.

• **USAF's current** turboprop test projects, being conducted by NACA, Military Air Transport Service and at Edwards AFB, will pay dividends in giving the Air Force superior equipment to meet the needs of an advanced logistic system, Wellman told IAS. The turboprop, he said, offers the potential of more capability per AF dollar, and future cargo transports such as the Lockheed C-130 and Douglas C-132 and C-133 will profit from current research.

Wellman also reported that MATS' two Convair YC-131C turboprops powered by Allison YT-56 engines flew 2,500 hours between January and December 1954 averaging 197 hours per aircraft per month with a total operating cost of $129.44 per flight hour.

Two Boeing YC-97Js, he said, have passed the 500-hour test mark and two Lockheed C-121Fs are now entering the test stage.

Wellman Proposes Solution

• **Wellman proposed** one possible solution to the lack of advanced design turboprop engines—a free turbine turboprop using a production jet engine as its gas producer. Under this arrangement, the propeller, its power shaft and offset duct would become a separate "thrust augmenter" to which the jet engine is attached.

As a result, the manufacturing, supply and repair of jet engines would become the same as for combat engines, bringing considerable advantage in cost, time and availability by simply tapping large jet engine production lines for the gas producer.

This approach might incur weight and frontal area penalties, Wellman concedes, but shows one approach to solving the turboprop engine availability program.

• **Despite almost inextricably-tangled** government organization, irresistible pressures from all sides on such organizations as the Air Navigation Development Board and CAA are bringing slow but accelerating progress toward a jet age air navigation and traffic control system, ANDB's J. L. Anast told the session.

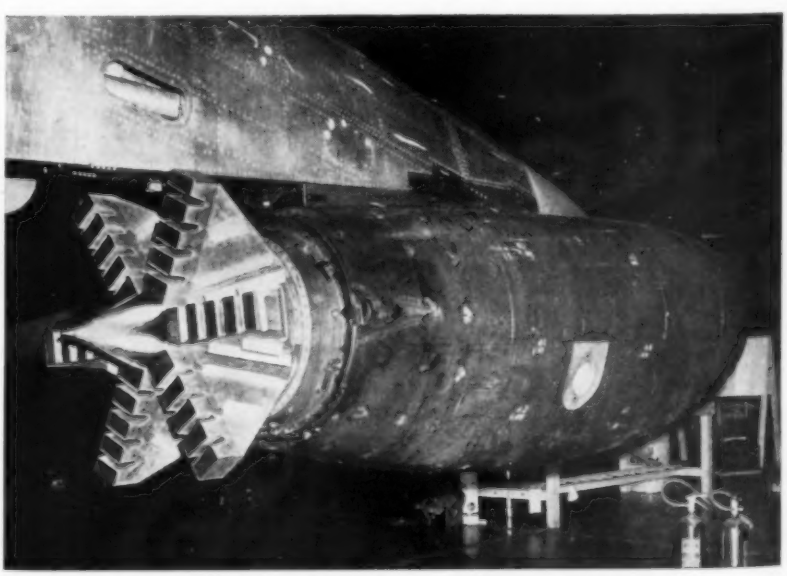
Anast disputed the theory that what we need is the invention of a new ATC system. Instead, he contended, we need such things as higher precision in our navigation system so that the "vanishing airspace" is not used so extravagantly, and we must relieve human controls of routine functions wherever this can be done safely.

He suggests that these controls be put in machines which "are better than humans in relatively simple repetitive functions."

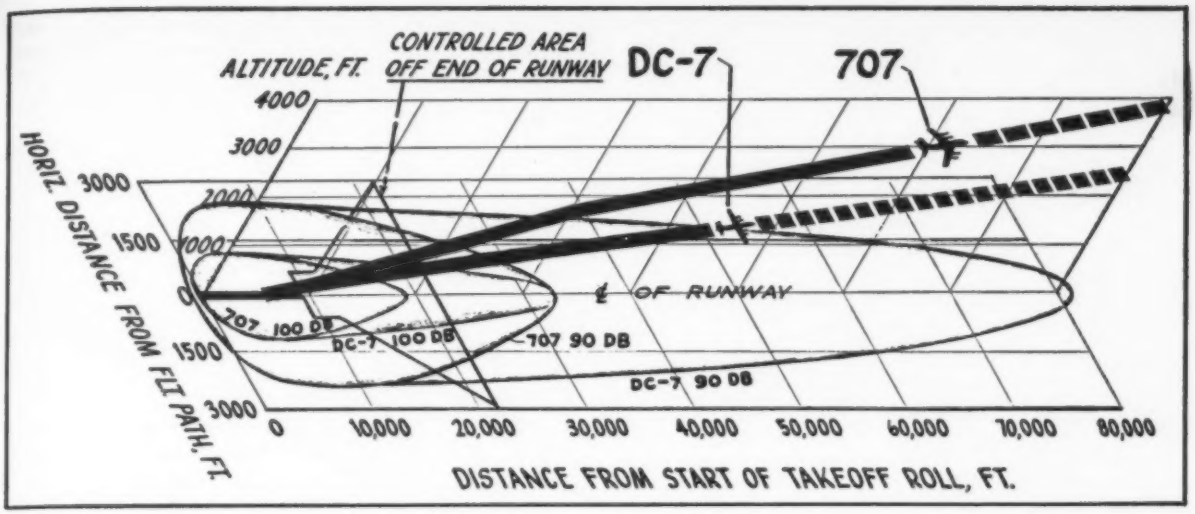
• **For navigation,** the ANDB engineer says we are now straight-jacketed to a rho-theta system which studies show is reaching a point of diminishing returns in use of frequencies, cost and complexity.

First improvement, says Anast, will probably come through elimination of four-course ranges. VOR, DME or Tacan will gradually give way to a non-line-of-sight system which will be suitable for all types of equipment from helicopters to high-speed aircraft and will have a better chance, both technically and economically, of being a common system.

This system, Anast adds, may be a scanning type such as Radio-Web and would probably never be replaced if our air defense radar system drops out of the picture. If ADC radar survives, he predicts the ultimate navigation arrange-



Another suppressor tested by Boeing is 6-corrugation model, presumably scheduled for flight evaluation.



Sound levels recorded on ground during takeoff of Boeing 707 jet and Wright Turbo Compound-powered Douglas DC-7.

ment will be a "radar-calibrated, short-term stability, self-contained system."

USAF Crash Safety

• **Air Force's crash safety program** will move from the research to flight-test stage soon when two Fairchild C-119s will start a 300-hour flight reliability test with a newly-developed crash safety system, the IAS session heard.

The new installation, designed by Walter Kidde & Co. of Belleville, N. J. is an outgrowth of NACA work on C-82 crash tests conducted in 1953. According to Kidde engineers E. R. Zeek and I. J. Hammill, it could be applied (with little modification) as a crash fire prevention system for upcoming jet transports.

Describing a proposed jet system, they pointed out that wing and fuselage deformation switches could still serve as crash-sensing devices to initiate system operation. Instead of an engine reaction switch used on the Wright Turbo Compound-powered C-119, a jet engine pod breakaway switch could be substituted.

As to the crash fire potential with jets, they said the prime ignition sources continue to be the hot surfaces of the engine, spilling of combustible fluids in the nacelles, or electrical wires. Although the jet presents a different "inerting" problem from that of piston engines, NACA has already demonstrated that jets can be very effectively inerted by properly applied coolant.

Simulator Economics

• **United Air Lines** expects to save more than $2 million during 1956 as the result of its use of Curtiss-Wright electronic simulators for DC-6 and Convair 340 pilot training, UAL's Bonnalie disclosed.

In United experience, Bonnalie said, the simulator is "by far the finest training tool available for the purpose." Since first use of simulators in February 1954, UAL has recorded well over 16,500 hours of instruction averaging 223 hours per month with each unit. Bonnalie expects this utility to pass the 300-hour mark once United's total of seven simulators now available or on order become operational.

Of United's plan for a DC-8 jet simulator, the UAL official said the advantages of having a simulator preliminary to the airplane are so great—especially for a transport costing more than $5 million that the airline will take the risk of an early order.

Although some future modification of the device is anticipated when actual DC-8 test information becomes known, Bonnalie feels these costs will be insufficient to offset the potential savings in training that would be lost if purchase of the simulator were delayed.

IAS REPORT (NO. 2)

Experts Differ on VTOL, STOL Design Characteristics

By ANTHONY VANDYK

Vertical and short takeoff and landing (VTOL and STOL) transport aircraft with good performance characteristics can be designed and built in the present state of the art. This conclusion could be drawn from the papers presented at the 24th annual meeting of the Institute of the Aeronautical Sciences in New York. It was made clear, however, that opinions are sharply divided on the characteristics of the STOL and VTOL aircraft.

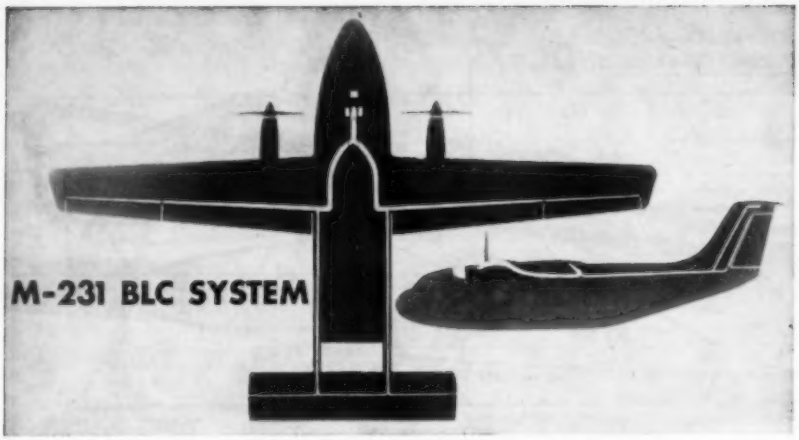
James A. O'Malley, Jr., of Bell Aircraft Corp., pointed out that a different type of aircraft is required for each speed bracket. His investigations have chiefly involved a configuration that would have a VTOL capability, a much better subsonic cruise speed than the helicopter, and better hovering efficiency than the jet-powered VTOL. His conclusion is that the ducted-propeller configuration is the answer for the speed bracket between 300 to 500 mph.

• **As shown** in the accompanying illustration, the ducted-propeller transport designed by the Bell engineer mounts two shrouded propellers at the wing tips. The shrouds enclose about 11-ft. diameter, multi-bladed propellers. Each shroud is rotatable through about 100° from horizontal.

The engines, "currently available turboprops providing about 12,000 hp," are interconnected to all of the propellers and can be visualized as using mechanical shafting.

Retractable takeoff flaps have been provided for high static thrust. In the vertical takeoff condition, the flaps on the shroud are extended and the engines are rotated to the vertical or 90° condition. A thrust of 42,000 lbs. would be available for takeoff. This would permit a transition to level flight in about 35 seconds.

Control for the hovering condition, where the lack of air flow over standard aerodynamic surfaces prevents them from being used, is obtained with a



Boundary layer control system for Fairchild M-231 can be applied to flaps, ailerons, elevators and both sides of rudder surfaces.

combination of reaction control and spoilers located in the propeller ducts. The landing path is visualized as a normal gliding approach at reduced power.

As the airplane nears aerodynamic stall speed, the shrouds are rotated to a 100° position where power is applied. The build-up to full thrust unloads the wing and decelerates the airplane to hovering. Power is then reduced and a vertical landing is made.

The airplane designed by Bell weighs 35,000 lbs., has a wing span of 83 ft. and an overall length of 55 ft. It is capable of lifting a payload of 4,000 lbs. in a vertical takeoff and transitioning to level flight, or it can use an STOL to carry an overload in a running takeoff. It would have a top speed of 430 mph.

A sample cruise calculation, based on a range plus a 60-minute hovering time, indicates that it would carry a payload of 4,000 lbs. a distance of 581 miles at 250 mph and 3,000-ft. altitude. At an operating altitude of 20,000 ft. range would be increased to 810 miles.

• **A very different type** of hypothetical aircraft design was presented to the IAS meeting by three engineers from the NACA Langley Aeronautical Laboratory—M. O. McKinney, R. E. Kuhn and J. B. Hammack. They also discussed briefly the work carried out by NACA in the past five years on VTOL transports, mainly with propeller-driven configurations.

The NACA design incorporates a combination of wing tilt and slipstream deflection. With a tilting-wing configuration the entire wing-propeller-engine combination is rotated to a vertical position for VTOL which involves some obvious mechanical complications. With the other arrangement, the propellers, engines and the forward part of the wing remain fixed to the fuselage and lift for VTOL is obtained by deflecting the propeller slipstreams by means of large-chord flaps or vanes. For this arrangement, the mechanical complication may be less severe than for the tilting wing. However, there are some obvious aerodynamic problems involved.

The combination of wing tilt and slipstream deflection was chosen because the former requires the least power for VTO but at low forward speeds the power required is much greater than for the latter. The deflected slipstream requires about 4,000 hp more than the tilting wing configuration at zero forward speed because of the thrust lost in deflecting the slipstream. The power required drops off very rapidly with forward speed, however, and above 10 knots this configuration requires much less power than the tilting wing configuration.

• **The NACA design,** which combines wing tilt and slipstream deflection, is based on the use of four Allison T56 turboprops driving 20-ft. diameter propellers, producing a total static thrust of 63,000 lbs. The propellers are interconnected with gears and shafts so as to maintain as much thrust as possible and keep the thrust symmetrical in the event of failure of one or more engines.

At a design gross weight of 60,000 lbs. the useful load was estimated as 19,000 lbs.—10,000 lbs. of cargo or 45 passengers, 500 lbs. for crew, and 8,500 lbs. of fuel. With this fuel the maximum still-air range at a speed of 400 knots and at an altitude of 40,000 ft. would be about 1,300 nautical miles; allowing for climb, letdown and fuel reserve, this should give a normal operating range of about 1,000 nautical miles.

Pitch and yaw control in hovering and at low forward speeds are provided by two small turbojet engines such as the Rolls-Royce Soar at the rear of the fuselage with vanes to deflect the jet exhaust. Roll control in hovering is provided by varying the pitch of the two outboard propellers differentially.

Advantages Explained

• **Advantages of boundary** layer control for STOL aircraft were explained to the IAS New York meeting by Walter Tydon, chief engineer of Fairchild Aircraft Division. He described the application of BLC to the M-231 as a means to reduce takeoff and landing distances by 25%. The controllable minimum flight speed of 45 knots is possible up to a gross weight of 54,000 lbs.

Without BLC a 50% increase in all surface areas plus a five-foot fuselage extension is necessary to achieve comparable low-speed performance, Tydon said.

Boundary layer control is applied to the flaps, ailerons, elevator and both sides of the rudder surfaces (required for one-engine-out performance). The system utilizes high-speed blowing and is activated by direct mechanical linkage between the surfaces and the BLC valving.

How boundary layer control is used to cut Fairchild M-231's landing run by 25%. BLC is applied to flaps and elevators.

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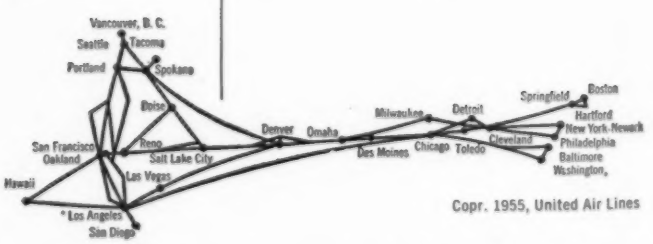

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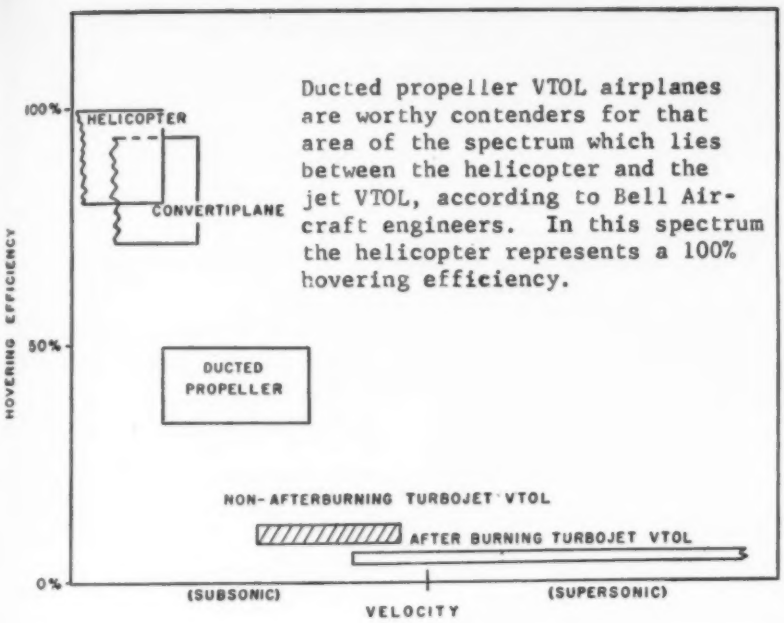

Ducted propeller VTOL airplanes are worthy contenders for that area of the spectrum which lies between the helicopter and the jet VTOL, according to Bell Aircraft engineers. In this spectrum the helicopter represents a 100% hovering efficiency.
100%
HELICOPTER
CONVERTIPLANE
HOVERING EFFICIENCY
50%
DUCTED PROPELLER
NON-AFTERBURNING TURBOJET VTOL
AFTER BURNING TURBOJET VTOL
0%
(SUBSONIC)
(SUPERSONIC)
VELOCITY

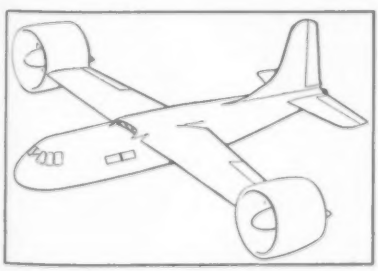
Fairchild's chief engineer warned that the stability and control problems should by no means be minimized for STOL aircraft designs. With air deflected downward from the wing, the conventional tail and its location are bound to require drastic revisions.

Tydon also pointed out that there will be a new set of gear requirements for STOL aircraft: "With the low takeoff and landing distances we will have capabilities to operate from small open fields, if not from potato patches, and we will have to provide for an undercarriage which will be suitable for these surfaces, *rain* or shine."

Summarizing the development of devices contributing to STOL aircraft designs and the objectives and methods for obtaining STOL characteristics, Tydon said that the following are required:

• To minimize wing and tail areas, reduce drag and maintain a wide speed range.

• To make up for wing area of the low speeds, by utilizing optimum high-lift devices: (a) flaps with boundary layer control and (b) application of the vectored slipstream principle in conjunction with (a).

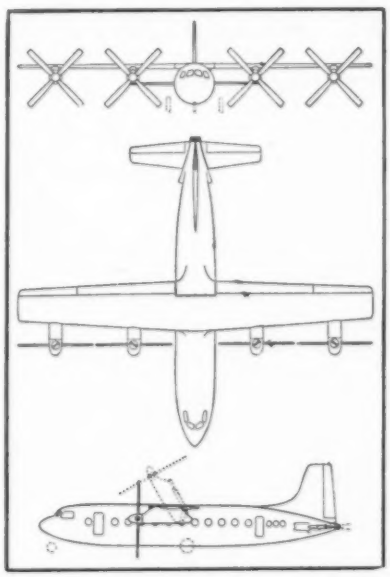


Bell's ducted-propeller transport design would use Allison T56 turboprops. Shrouding a propeller adds at least 25% in static thrust and reduces noise substantially.

• To produce vertical force directly from powerplants during landing, by (a) variable thrust incidence and (b) vectored slipstream with auxiliary drag devices.

• To consider the shrouded propeller with its improved low-speed thrust of approximately 25%.

• To augment normal power with other types of powerplant such as turbojets. In each case the "jet wing" or "jet-induced lift" principle, jet exhaust deflection or tilting of the jet engine may well be applied. ◆◆◆



This hypothetical NACA design for a VTOL transport combines wing tilt and slipstream deflection. It uses four Allison T56 turboprops plus two Rolls-Royce Soar turbojets in tail.

Lockheed Revamps Missiles Division

Lockheed Aircraft Corp. announced its Missile Systems Division will build $7 million in new facilities, including two research laboratories at Stanford University, Palo Alto, Calif., and a missile manufacturing plant at Sunnyvale, Calif. The projects are part of a $20 million program to expand the division's missile activities over the next three years.

Lockheed also reorganized the research and engineering branches of the Missile Systems Division last month. The instrument and data analysis department was transferred intact from the engineering to the research branch, while flight control personnel in research were transferred to the engineering branch.

The realignment of personnel followed the resignation in December of the division's former research director, Dr. Ernst Krause, and 14 other missile research scientists. The scientists quit in a row over control of the division's activities.

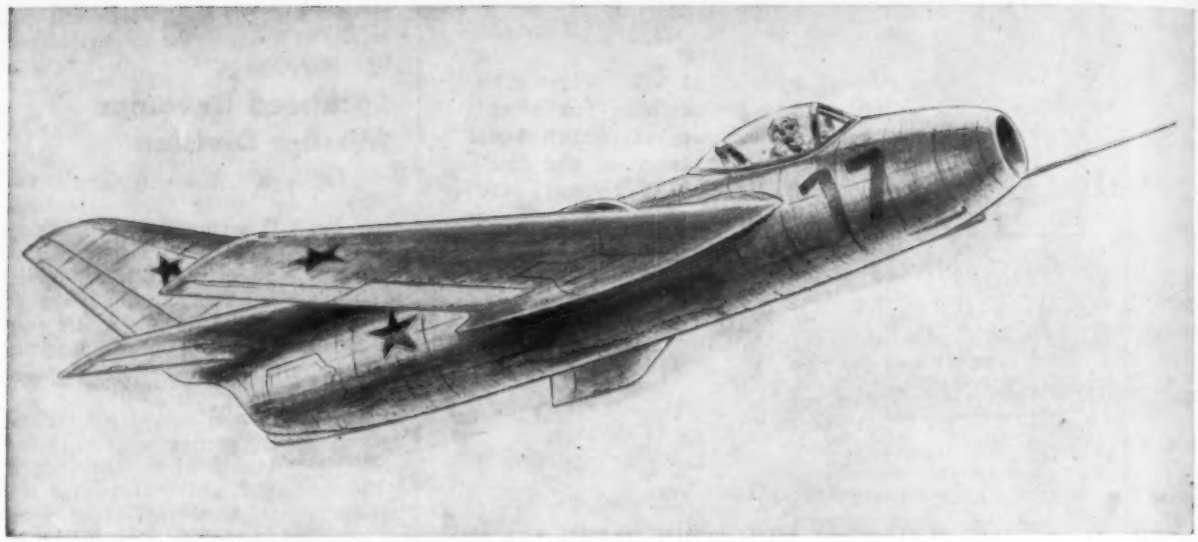
Lockheed missile activities now centered at Van Nuys, Calif., will eventually be moved to the new locations in northern California. Construction will start immediately on two laboratories of 51,000 square feet each on a 22-acre site leased from Stanford University. Building will get under way as soon as plans permit on 96,000 square feet of manufacturing space at the company's 275-acre site at nearby Sunnyvale. It's expected work will be completed by year's end, and that about 500 employes will then be at work at the two sites.

Air Force Shopping For New Jet Trainer

Probable future need for a jet trainer/proficiency flying plane somewhere between the Cessna T-37 and the Lockheed T-33 has been indicated to a number of qualified airframe companies by the USAF. Notification of the "general operational requirement" (GOR) is not a competition.

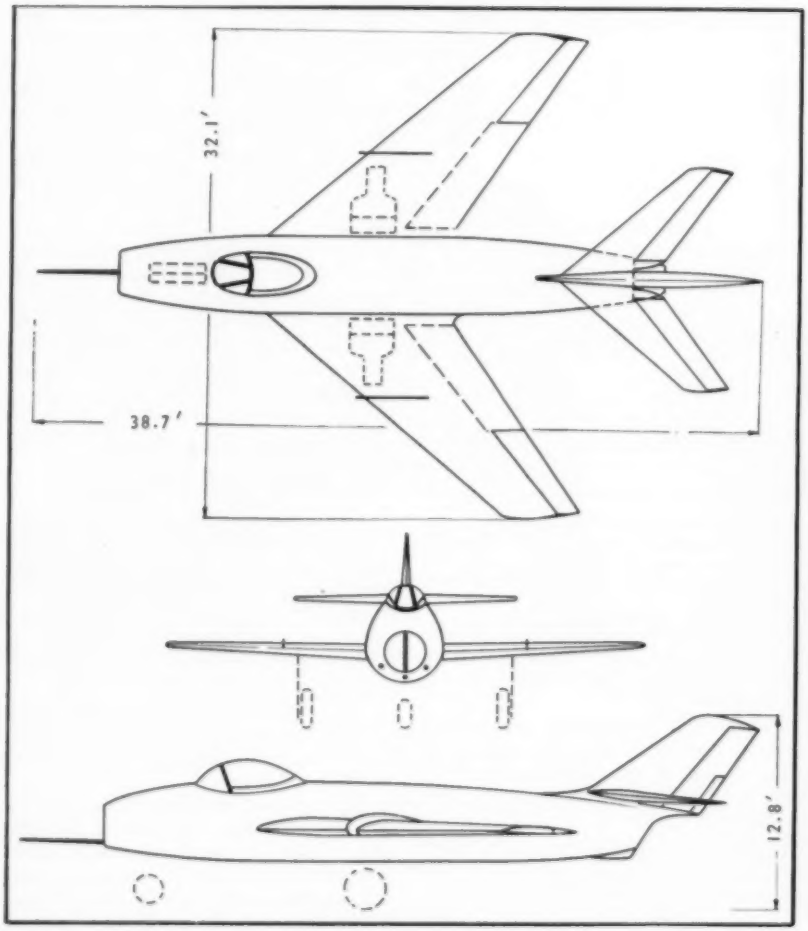
Air Force is hoping that the companies involved will put more of their own cash into research and development of such an aircraft.

The action is presumably a compromise between the old wide-open competitions in which just about every company submitted an entry and last year's announced policy of using Phase 1 contracts to prevent the loss of engineering man-hours by unqualified concerns.



Farmer is the Red Air Force's equivalent of the North American F-100.

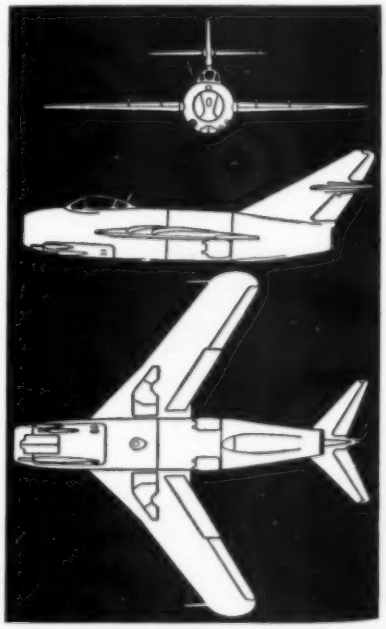
Details of Latest Russian Fighter Revealed



This three-view drawing of the Farmer was supplied through AMERICAN AVIATION'S intelligence sources.

Exclusive new data on Russia's latest fighter, the Farmer, has been received by AMERICAN AVIATION. The Farmer is in quantity production and about 50 were seen over Moscow last July 3.

The Farmer may be considered the Russian equivalent of the North American F-100 Super Sabre. Although it has smaller range and lower payload than the F-100 the new Russian plane seems to be at least equal to the F-100 in



The MiG-15 has radar in the version illustrated above.

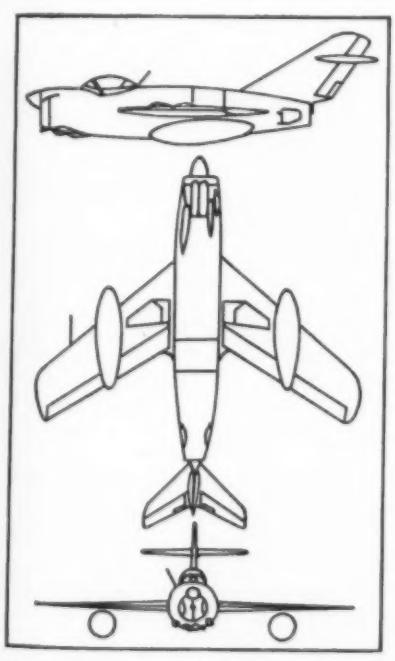
Russian Fighter Data

	MiG-15 Fagot	MiG-15 Fagot	MiG-17 Fresco	Farmer
Engine	RD-45-1	VK-1	VK-2R	Klimov WK-56
Thrust (lbs.)	5,500	5,995	5,940	9,900
Thrust (with afterburner)	.....	.....	7,480	13,200
Crew	1	1	1	1
Length (ft.)	36.4	36.4	36.5	38.7
Height (ft.)	11.2	11.2	11.2	12.8
Span (ft.)	33.1	33.1	37.2	32.1
Wing area (sq.ft.)	255.0	255.0	297.0	302.1
Empty weight (lbs.)	8,320	8,470	9,830	13,200
Useful load (lbs.)	2,950	5,755	5,940	8,360
Combat load (lbs.)	615	1,025	2,860	2,420
Gross weight (lbs.)	11,265	14,225	12,980	19,800
Fuel (lbs.)	2,180	4,290	2,860	5,500
Oil (lbs.)	155	220	220	440
Wing loading (lbs./sq.ft.)	44.3	56.0	43.9	65.6
Power loading (lbs./sq.ft.)	21.5	23.6	25.2	43.9
Weight/Power (lbs. weight per lb. thrust)	2.04	2.4	1.7	1.5
Maximum speed (m.p.h.)	666	665	730	901 at 36,000 ft. 779 at sea level
Stalling speed (m.p.h.)	109	109	99	.....
Climbing time	1 min. to 10,400 ft.	.....	1 min. to 10,500 ft. 6.4 min. to 39,400 ft. 9.5 min. to 49,200 ft.	1 min. to 12,800 ft.
Rate of climb (ft./min.)	10,400	.....	10,500 ft.	12,800
Ceiling (ft.)	51,000	.....	57,000 ft.	57,500
Range	1 hr. at 39,400 ft. 30 min. at sea level	2.3 hrs. at 39,400 ft. 45 min. at sea level	1.6 hrs. at 39,400 ft. 30 min. at sea level	1.5 hrs. at 39,400 ft. 30 min. at sea level
Remarks	without wing tip tanks normal weights	with wingtip tanks and overload	performance figures with afterburner	performance figures with afterburner

speed, climbing ability and ceiling. The prototype of the Farmer was designated ZAGI-418.

The Farmer is basically a development of the original MiG-15. The original MiG-15 had the RD-45-1 engine, but later models had the more powerful VK-1. This later MiG-15 has sometimes been known as the MiG-15bis. The MiG-15bis was followed by the MiG-17 which had a more slender wing with a greater dihedral. Improved areodynamic configuration of the MiG-17 made it somewhat faster than the MiG-15 and gave it a rate of climb of some 250 feet per second with afterburner.

As may be seen from the accompanying data chart, the Farmer represents a tremendous improvement, performance-wise, over the MiG-17. It appears to be extremely maneuverable and should be capable of making a turn at ground level within a radius of about 2,300 feet. At an altitude of 33,000 feet the turning radius would be about 12,000 feet. ◆ ◆ ◆



The MiG-17 Fresco is basically an improved MiG-15 with a more slender wing with greater dihedral.

Designer Not Necessarily Producer, AMC Says

A high Air Force procurement official cautioned companies holding development contracts not to expect production orders as a matter of right, even though the item may be ordered into production.

"The right to go to the qualified elements of the industry on a competitive basis is inherent in any agreement reached between the government and the development agency," declared Maj. Gen. David H. Baker, Director of Procurement and Production for the Air Materiel Command.

The USAF naturally prefers to give the production order to the developing company "provided the price and capability . . . are satisfactory," he told an Air Force Association meeting in Chicago. He added, however: "No government-supported developer can expect automatically to receive a production contract without full consideration of competition and ultimate costs to the government."

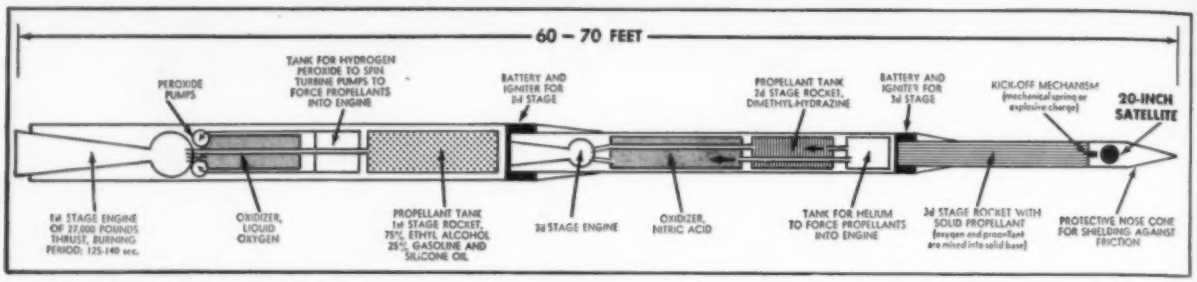
General Electric Enters Computer Market

The General Electric Co. has entered the industrial computer field. To move into full-scale computer development and production, the company has integrated its specialized engineering and military computer work in a new Industrial Computer Section as part of the Electronics Division.

Activity for marketing and promoting a line of computers will include development of machines of the analog, digital and simulator types. The machines will be designed for business, engineering and automation of factory production. They will range in size from "pocketbook editions" to giant machines costing millions of dollars, according to GE's announcement.

In line with GE's continuing "overhaul" of its organization into decentralized operating units, the new computer activity will maintain its own engineering, marketing and sales functions within the section. General Manager of the section is H. R. Oldfield.

How Satellite Vehicle Will Be Propelled into Space


60 – 70 FEET
PEROXIDE PUMPS
TANK FOR HYDROGEN PEROXIDE TO SPIN TURBINE PUMPS TO FORCE PROPELLANTS INTO ENGINE
BATTERY AND IGNITER FOR 2d STAGE
PROPELLANT TANK 2d STAGE ROCKET, DIMETHYL-HYDRAZINE
BATTERY AND IGNITER FOR 3d STAGE
KICK-OFF MECHANISM (mechanical spring or explosive charge)
20-INCH SATELLITE
1st STAGE ENGINE OF 27,000 POUNDS THRUST, BURNING PERIOD: 125-140 sec.
OXIDIZER, LIQUID OXYGEN
PROPELLANT TANK 1st STAGE ROCKET, 75% ETHYL ALCOHOL 25% GASOLINE AND SILICONE OIL
2d STAGE ENGINE
OXIDIZER, NITRIC ACID
TANK FOR HELIUM TO FORCE PROPELLANTS INTO ENGINE
3d STAGE ROCKET WITH SOLID PROPELLANT (oxygen and propellant are mixed into solid base)
PROTECTIVE NOSE CONE FOR SHIELDING AGAINST FRICTION

Artist's conception of the Project Vanguard satellite-launching vehicle which Glenn L. Martin Co. is building for the Navy. First stage is similar to the Martin Viking, but will use an improved General Electric Co. rocket motor in place of the Reaction Motors, Inc., powerplant in the Viking. Aerojet-General Corp. will provide the engine for the second stage. No contractor has been announced for the third stage-motor.

Rising Demand for Jet Fuels to Create Major Supply Problem, Pentagon Warns

Pentagon has served notice on the U.S. petroleum industry that sharply rising demands for jet fuels probably will create one of our greatest problems in the future.

Brig. Gen. W. W. White, retiring staff director of the petroleum Logistics Division, told a recent National Petroleum Council meeting in Washington that military needs for jet fuel will jump 47% from 231,000 barrels a day in fiscal 1956 to 340,000 barrels by fiscal 1965.

Paralleling this increase, U.S. civilian jet fuel demands will jump from 12,000 barrels a day at present to about 70,000 barrels by 1965. Defense attributes about 10,000 barrels of current civil jet fuel consumption to engine testing and test flying by jet engine and aircraft manufacturers.

• **Combined military and civil** needs, White said, would result in a total peacetime jet fuel demand of about 410,000 barrels per day by fiscal 1965. In event of war, assuming a long, drawn-out conflict involving extensive supersonic jet operations, White says fuel requirements could increase to between one and two million barrels a day.

Jet aircraft consume a tremendous amount of fuel, he warned, citing some of the larger U.S. military aircraft that consume more than 2,500 gallons per hour. (Assuming one to be the eight-jet Boeing B-52, this would mean a 312-gallon hourly consumption per engine, or the equivalent of more than a ton of fuel per hour.)

Gen. White posed as "another important question" what type of fuel the airlines will select for future civil jet transport operations. Since jet fuels are just coming into being, he urged that industry provide for civil/military standardization now, at least to the extent that commercial jets be designed to operate on military fuels should the need arise.

• **To support his point,** the Pentagon fuel expert traced World War II experience when essentially all aviation gasoline was produced to meet military specifications because of refining and logistic considerations. "In a future emergency, standardization to military specifications will be necessary for jet fuels," he warned.

Of present military fuels, White said JP-4 is the predominant type in use today, but that a heavier fuel is required for supersonic aircraft and missiles. For want of a better designation, he calls this "super-fuel" JP-5, a type which the Navy now plans to use aboard aircraft carriers.

One of the major factors which would impose greater limitations on the use of this super fuel, White feels, is the need for high temperature stability. Conceding that extensive research is under way to develop standard methods for testing JP-5 stability, he says there is considerable concern as to whether the refining industry would have enough processing capacity to produce required volumes of JP-5 fuel to meet the high-temperature stability limits needed in wartime.

AEC Tests GE Nuclear Aircraft Powerplant

The Atomic Energy Commission has announced the start of tests on a prototype aircraft nuclear powerplant built by General Electric Co. Tests are being conducted at the Commission's National Reactor Testing Station in Idaho.

"The aircraft nuclear propulsion program for nuclear-powered flight continued to show promise," AEC said in its 19th semiannual report, covering operations for the latter half of 1955.

"Construction of initial test facilities at the aircraft nuclear test area at the National Reactor Testing Station was completed and some test work commenced," AEC said. It added that construction started last fall on a new Air Force plant and laboratory at Middletown, Conn., "which will enable Pratt & Whitney Aircraft Division to enter more extensively into the aircraft nuclear propulsion program."

Researchers See Need for 560 Multi-Engine 'Copters

A total national requirement for about 560 multi-engine transport helicopters between 1955 and 1965 was predicted by Stanford Research Institute in a study of helicopter navigation requirements for Bendix Aviation Corp.

Aggregate commercial and military requirements for navigational equipment will call for about 1,200 airborne components of any major navigation system selected for use, the study said.

But the Stanford researchers made it clear that these potential requirements are predicated on the advent of multi-engine helicopters in production quantities. This will occur about 1960, the report indicated.

"An area coverage system of navigation appears to be the only technically, economically and operationally feasible system for extensive air carrier helicopter operations," the report said. It added that commercial helicopter operations would probably be restricted to altitudes below 2,500 feet and above 300 to 500 feet.

Obituaries

E. N. Whitney, 53, director-flight operations, Western Air Lines, died Jan. 27. He had been with WAL 26 years, starting in company's communications department in 1930.

Charles Edward Taylor, 87, who built the engine for the Wright Brothers' Kitty Hawk airplane, died Jan. 30 at Foothill Sanitarium, San Fernando, Calif. Aircraft Industries Association two months ago established a special fund to care for Taylor the rest of his life.

A FEW OF THE new

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The valves shown are representative of an expanding line being built to meet rapidly advancing airborne requirements. They were developed in close cooperation with the airframe and power plant engineers who are using them. They are products of Vickers El Segundo (California) Division, which has complete engineering, laboratory and production facilities for "concept-through-production" of airborne hydraulic valves.

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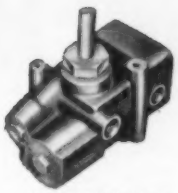
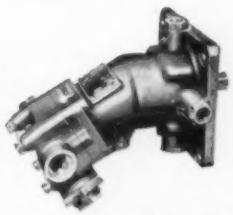
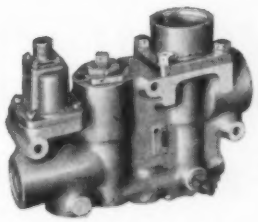


Constant Gain Nose Wheel Steering Valve

Flow-Sensitive Pressure Regulator



Motor with Constant Speed Valve



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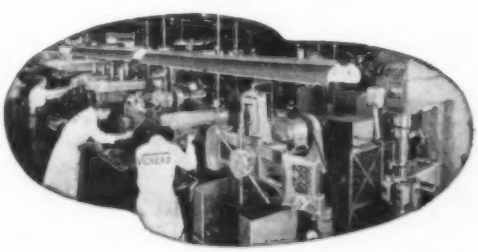

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CAA - Weather Service To Be Expanded

Expansion of a new flying weather broadcast service has been announced by Louis S. Rothschild, Under Secretary of Commerce for Transportation. The new service, which has been operating on test on the low frequency air navigational radio range at Arcola, Va. since the fall of 1954, provides a continuous broadcast of aviation weather and notices to airmen. It is a cooperative effort between CAA and the Weather Bureau.

Initially, 21 additional broadcasts will be established during 1956. The ultimate plan involves a broadcast network of 88 stations to provide continuous weather information on low and medium frequency radio ranges to give service coverage for the entire U.S.

Los Angeles will be the first to get the service this month, followed by installations throughout the year at CAA ranges at Albuquerque, Atlanta, Boston, Chicago, Cincinnati, Cleveland, Denver, El Paso, Fort Worth, Indianapolis, Kansas City, Memphis, Minneapolis, New Orleans, New York, Oakland, Pittsburgh, Portland, Seattle and St. Louis.

CAA operates the broadcast and provides notices to airmen on navigational aids and airports, with the Weather Bureau providing the weather data. Specially designed tape recorder and repeater equipment is used which contains up to 12 individual units, each unit reporting in succession separate bits of data.

After the latest information is put on the tape, the equipment is switched to broadcast and is automatically transmitted. Broadcast cycle is from four to six minutes, after which it is repeated.

Republic Sells Rights To Seabee Amphibian

Republic Aviation Corporation has sold all rights to its Seabee four-place all-metal amphibian to J. K. Downer of Saginaw, Mich. He is setting up a new corporation at Tri-City Airport near Saginaw to handle all orders for spares and service.

The sale includes transfer of all tools, jigs, dies, lofting, engineering, records and spares inventory, as well as rights to the name and manufacture of the Seabee. No sale price was disclosed.

More than 1,000 Seabees were built from 1945 until production was discontinued in the spring of 1947. Most of them, Mundy I. Peale, Republic president, noted, are still in use around the world.

Downer, reportedly, is considering manufacture of the aircraft at some future date.

New 2-TERMINAL

SERIES L-6600

Only $1\frac{15}{64}$" long from lens to terminals, this new Hetherington light gives wide-angle visibility in both standard and edge-lit panels. Uses 6, 14 or 28 volt AN-3140 lamps in a unique mounting so light is "piped" evenly throughout the long plastic lens. Lamp circuit insulated from case to meet the needs of electronic equipment. Mounts in $\frac{15}{32}$" diameter hole. Can be supplied with "taper tab" terminals. Also available with 1-terminal, case ground, as Series L-6000.

2 *smaller*

INDICATOR LIGHTS

for compact Aviation and Industrial Assemblies

New "PRESS-TO-TEST"

SERIES L-3200

Here's added safety for critical warning light jobs. Lamp and its circuit can be "checked out" before take-off by pressing spring-mounted plastic lens cap. Uses same lamps and lens assembly as L-6600 shown above. Lamp circuits insulated from case. Housed in lightweight anodized aluminum case. Mounts in $\frac{1}{2}$" diameter hole.

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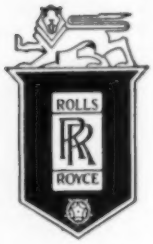

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BOOKS

Guidance. *By Arthur S. Locke. Published by D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. 729 pp. Price: $12.50.*

One of the most extensive technical compilations yet produced on guided missiles. *Guidance* is the first of a series on missile design to be co-authored by consultants and scientists of the Naval Research Laboratory. Treated in detail are such subjects as current guidance systems, tactical considerations, servo system theory, the missile air frame and missile economics.

Sound Barrier

By Neville Duke and Edward Lanchbery. Published by Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. 129 pages. Price $4.75.

This is a completely revised edition of a book by two British authors that describes the technical and historical aspects of high-speed flying. It tells the story of high-speed flight for the general, non-technical reader in a manner which enables him to understand the obstacles already faced and overcome as well as problems ahead. The book is divided into four parts: Supersonic and High Altitude Flying; Design for Speed; Design for Use (the compromise between the ideal theoretical aircraft and practical considerations and Things to Come.)—A.V.

Aircraft Badges and Markings. *By Harold B. Pereira. Published by John De Graff, Inc., 64 W. 23rd St., New York. 48 pp. Price: $1.50.*

A pocket-sized compilation of national aircraft markings and airline insignia (including some far out of date).
JSM

Principles of Helicopter Engineering. *By Jacob Shapiro. Published by McGraw-Hill Book Co., New York 36, N. Y. 433 pp. Price: $12.50*

A comprehensive textbook on helicopter engineering written for the technician involved in helicopter design, production, inspection, maintenance or operation.

Combustion Processes. *Published by Princeton University Press. 662 pp. Price: $12.50.*

This detailed treatment of all aspects of combustion is primarily slanted at combustion engineering for high-speed flight, including current theories and unsolved problems. Discussed in detail are combustion of liquid and solid fuels and propellants. A concluding section deals with energy production by nuclear reactions.

ANNOUNCING
a new long life BG spark plug

The new BG platinum electrode spark plug – RB 39R – has now been CAA approved for Pratt & Whitney's R4360, R2800, R2000, R1830 series engines.

Designed in the tradition of quality established by BG, a leader in the field since 1917, the RB 39R features a new anti-fouling ceramic core design, an all weather top, and a new ground electrode design for long life.

As an added service, BG maintains a facility for factory overhaul of all platinum electrode spark plugs. Factory overhaul combines economy with long life and trouble free service.

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For information concerning the RB 39R and other BG products, write to:

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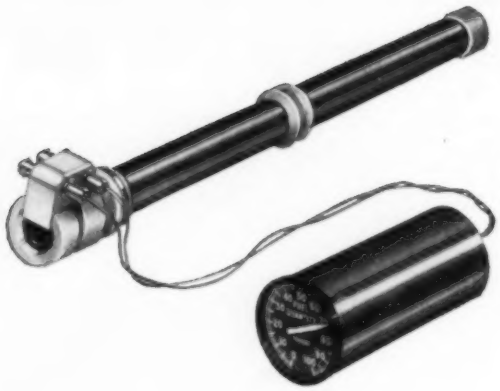

This is the newest Honeywell fuel gage. Completely transistorized, it's smaller, more reliable, and as light as 0.8 pound per system. And like Honeywell's pioneer electron-tube gage, it's so accurate it measures any fuel load to within two-tenths of one percent. Honeywell's fuel measurement systems are specified for more than 120 different models of aircraft.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL

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INVESTMENT TRUSTS HESITANT ON AVIATION STOCKS

By SELIG ALTSCHUL

Capital demands by both the airline and aircraft groups are known to be of a substantial nature in the years ahead. A major source of equity capital has long been present in the reservoirs of funds controlled by investment trusts. At the 1955 year-end, it was reported that assets of these funds were in excess of $9 billion as compared to but $1 billion in 1940.

These funds, by the sheer size of capital controlled, are obviously an ever-growing factor in the American economy, as they can underwrite major expansion programs for industry.

Further, corporations with stock in the hands of the public are most anxious to have their securities held by these investment trusts. It does a number of things: it affords them with stable stockholders who maintain long-term positions, it develops an established source for obtaining additional capital; and, further it builds investment "character," as individual investors are impressed with such trust holdings and frequently are guided to make similar commitments of their own.

• **In this respect,** still other reservoirs of capital but of a more conservative nature are those provided by other institutional sources such as insurance companies and pension funds. Despite their conservative nature, these fiduciaries have shown tendencies to invest a larger percentage of their funds in common stocks so as to obtain better yields and some capital appreciation through participation in growth situations.

For example, the Securities & Exchange Commission, in a recent study, showed that "non-insured pension funds" had some $11.25 billion in assets at the 1954 year-end, of which more than $2 billion was invested in common stocks.

Against this supply of funds must be placed the demand factor. For this, guidance may be had from a leading industrialist who recently placed the need of new public financing in the next ten years at a minimum of $160 billion. Whether or not this demand will be realized to the full extent indicated is not subject to precise analysis.

It is significant, however, that the airline and aircraft groups are not alone in seeking new capital but must compete aggressively for funds with other leading industries. Therefore, the aviation industries must maintain such investment stature as to attract new money at terms no less favorable than available to other industries.

National Aviation Corporation Portfolio—December 31, 1955

No. of Shares	Company
	Aircraft
5,000	Bell Aircraft
15,000	Boeing Airplane
20,000	Cessna Aircraft
18,000	Collins Radio, Class "A"
7,000	Collins Radio 4% Preferred
10,000	Curtiss-Wright "A"
15,000	Douglas Aircraft
6,250	Garrett
8,500	G. M. Giannini & Company, Inc.
156,000	Greer Hydraulics, Inc., 5½% Debentures—1965
7,500	Lockheed Aircraft
5,250	Glenn L. Martin
25,000	North American Aviation
12,500	Thompson Products
20,250	United Aircraft Corporation
2,000	United Aircraft Corporation, Preferred
	Airlines
100,000	American Airlines
30,700	Braniff Airways
20,000	Capital Airlines
100 M	Continental Air Lines, 4¾% Debentures—1970
15,000	Delta Air Lines
38,500	Eastern Air Lines
5,000	Helicopter Air Service
5,000	New York Airways
10,000	Northwest Airlines, 4.6% Preferred
20,000	Pan American World Airways
50,000	United Air Lines

• **In a broad sense,** aviation securities have not been too popular with general investment trusts or fiduciary funds. Past periods of instability and the risk elements involved have tended to discourage commitments when investment opportunities less clouded were present in other industries. Further, in a number of cases, some trusts had some unfortunate past experiences which are not without effect in appraising new placements.

Yet investment trusts can be most helpful in providing a source of capital to the aviation industry and find it profitable to do so if approached with courage and discerning selectivity. This has been consistently demonstrated by the record of National Aviation Corporation, the largest and one of the few remaining specialized aviation trust funds. This successful record further make its 1955 portfolio shifts and holdings of particular interest.

At the 1955 year-end, National Aviation held net assets in excess of $21 million, equivalent to $37.59 per share on 558,092 shares outstanding. This was after total dividends of $2,845,335 paid during the year and after the infusion of $3,318,000 in new capital through the sale of 111,618 shares of stock. Total assets of National Aviation were at the highest peak in its history and followed the realization of the largest income, both ordinary and capital gains, in any one year—$2,939,109 in 1955 as compared with $2,670,427 in 1954.

• **During 1955,** the trust increased its airline holdings and cash position while the aircraft commitments showed a relative decline. In other words, at the 1955 year-end, airline investments represented 42.6% of the total investments compared with 34.4% a year earlier and aircrafts during the same period declined from 61.7% to 48.6% while cash and equivalent rose from 3.9% to 8.8%. The complete aviation holdings as of the 1955 year-end are shown in the accompanying table.

During 1955, major aircraft and accessory company increases included: 5,000 Cessna, 18,000 Collins "A" and 7,000 Collins Preferred, 4,500 G. M. Giannini and $81,500 Greer Hydraulics debentures. Major sales in this category included: 13,000 Bell, 5,000 Boeing, 1,950 Lockheed, 2,500 North American Aviation, and 1,500 Thompson Products.

Last year, significant net airline increases were represented by 11,000 Eastern, 10,000 Northwest preferred, 20,000 Pan American and 9,605 United Air Lines. On balance, decreases con-

sisted primarily of 5,000 Helicopter Air Service.

• It is noteworthy that the aircraft portfolio at the 1955 year-end with a total cost of $3,127,623 had a market valuation at that point of more than $10.3 million. Ironically, the trust's highly successful record in these selections can conceivably serve to reduce its capital resources as profits are realized.

As a regulated investment company, National Aviation, for the tax advantage of its stockholders, has elected to distribute the bulk of its income. In so doing, its investment capital, built-up through capital appreciation, is automatically reduced. It was for this reason that additional shares were offered to shareholders last year and which, in part, restored investment capital.

At December 31, 1955, total airline holdings having a cost of $6,461,712 were valued at $9,086,900. Significantly, at present, the only commitments having market valuations below cost are in companies having varying degrees of subsidy dependence—Pan American, Braniff and Northwest.

• Most of the general investment trusts have not yet released their detailed positions at the 1955 year-end. At last reports, however, there was no stampede into airline or aircraft securities.

A compilation of 14 major trusts, however, showed that during the quarter ended September 30, 1955, on balance they sold 115,000 American Airlines common while purchasing 13,500 Capital, 5,000 United Airlines, and 19,800 Boeing and 27,000 North American Aviation.

A recapitulation of all trust holdings of aviation shares is not likely to show any over-riding popularity of this group as an investment nor represent any significant percentage of the indutry's capitalization. ◈◈◈

MATS Airlift Contracts Total $3 Million

Overseas National Airways and California Eastern Aviation have each received $1.5 million contracts for airlift of military passenger and cargo in the Pacific. The carriers, who will operate on orders issued by MATS, will transport a minimum of 62.5 tons monthly, with the possibility of expanding to 100 tons. Contract runs from Feb. 1 through June 30. Eighteen other carriers will receive call-type contracts for service as required by MATS in the Atlantic, North Africa and Pacific areas.

Eisenhower Names FCC Full Member of ACC

Increased emphasis on inter-agency planning for solution of navigation and communications problems is seen in President Eisenhower's naming of the Federal Communications Commission to full membership on the Air Coordinating Committee. FCC formerly had no full-time ACC representation, but some of its officials had served on working groups of ACC panels.

E. F. Johnson Heads Air Cargo Group

Emery F. Johnson has been elected president of Air Cargo Inc., airline-owned cargo organization. For the past six years he has directed ACI's activities as vice president and general manager, although the president of the Air Transport Association has acted as nominal president. Johnson has been with ACI since 1947, and has been in aviation since 1930, serving with Western Air Express, TWA and United.

Stuart G. Tipton, newly-elected ATA president, resigned as ACI general counsel and was named to the board of directors. Russell Bernhard, ATA assistant general counsel, replaces him as general counsel. Other new director for 1956 is A. G. Hardy, senior v.p.-Washington of National Airlines.

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New oil seal puller does the job quickly and easily without damage to parts and castings.
The Patton Oil Seal Puller was designed to eliminate the waste of time in removing oil seals. In addition to the time-saving advantages, this precision tool prevents scoring and damage to the metal seat that holds the oil seal. The complete set consists of six expanding heads and two hammers. The size range, from 3/8" to 4½", handles all oil seals in general use. Larger or special sizes may be custom made for specific requirements.
Originally designed for the Armed Forces, the Patton Oil Seal Puller is now used by maintenance and repair shops in the following industries: aircraft, automotive, agriculture, construction, marine and oil fields. In fact, wherever machinery and equipment are repaired, Patton Oil Seal Pullers save costly man hours and prevent unnecessary damage to component parts.
GUARANTEED • All parts of the Patton Oil Seal Pullers are fully guaranteed by the manufacturer. Each item is thoroughly tested before shipment. Only high quality tool steel is used in the expanding head. Small nicks in the lips of the expanding head, caused by improper care, do not greatly impair the efficiency of this tool.
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This new and better nose strut is a rugged self-contained unit that can be built in as an integral part of any nose strut. It actually does the work of two conventional mechanisms with the hydraulic power cylinders taking the place of the upper scissors member of the usual torque link.

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In addition, shimmy dampening is more effective because dampening forces are applied at a point where there is the least amount of spring action in the system.

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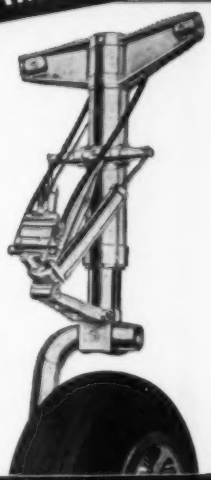

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Bendix Products Division

Bendix AVIATION CORPORATION

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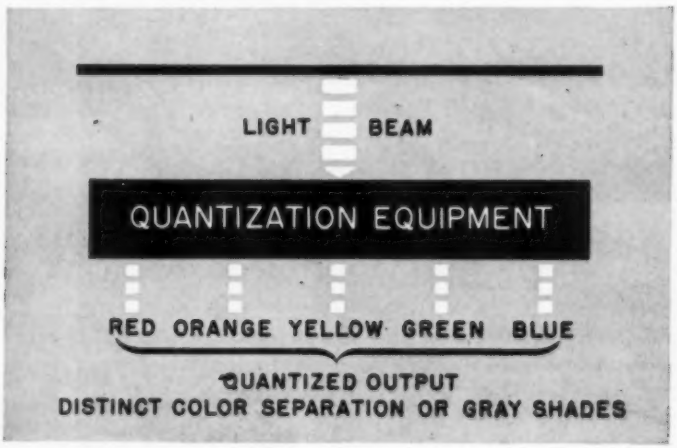
FORD INSTRUMENT QUANTIZES LIGHT

Colored lines or spots on a piece of paper can become a means of conveying information — Rorschach charts, impressionist paintings and survey maps are all visual message carriers. Ford Instrument engineers found it necessary to translate such color information into electrical or mechanical quantities, (quantization) with less distortion than is inherent in the usual photographic techniques. Such quantities can in turn be used as signals that actuate computers, make offset plates, and generally put to use the information implied by the difference between the colors or the distribution of the colors.



The quantization performed by Ford is not restricted to color alone. For example, a black and white photograph represents an aggregate of light and dark areas of varying shades, and this display must frequently be converted into continuous or discrete electrical quantities for various purposes and uses. Ford engineers recently developed equipment which can quantize and record the various degrees of color, or gray areas in photographic negatives, and to correlate this information into usable data. This equipment was developed for a classified project — the equipment is unavailable for general use — however the technical know-how gained by Ford — combined with Ford's superior production and engineering facilities — is available in the creation of light quantizing equipment for you.

Light quantizing is but one of the many facets of Ford Instrument design and development. For more information about Ford's products, services and facilities, write for an illustrated folder. Ford engineers will be happy to discuss your problems of control with you.

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Equipment used for defense must undergo rigorous tests for accuracy and dependability in combat. At Ford, environmental testing laboratories reproduce extremes of desert or arctic battle, shock of warship broadside, salt fogs and heavy seas. When flaws have been detected and corrected, equipment is okayed for volume production and use throughout the armed services.

Typical of Ford Instrument's 40 years of experience in precision control is its work in the field of nuclear power. The Company, for example, is building the control rod drive mechanism for the Seawolf, second atomic submarine. Reactor designs, sensing mechanisms, control equipment and systems, nuclear calculations, and other specialized equipment and abilities are offered by the Company to this expanding industry.

Circle No. 15 on Reader Service Card.

SAGE: Men Make Decisions, Machines Do Work

Details of Air Force's semi-automatic air defense electronics system revealed by scientists at M.I.T.'s Lincoln Laboratory.

By HENRY P. STEIER

Today, time has an ever-diminishing value as a stratagem for defensive action and an ever-increasing value for attack. To counterbalance the threat of these changing values inherent in modern air warfare is the ultimate goal of the electronics environment known as SAGE, which the Air Force has adopted for continental defense against air attack.

A carefully restricted amount of information on what the Semi-Automatic Ground Environment system is and how it works was recently released by the Department of Defense through the Air Force, which is sponsoring the project (AMERICAN AVIATION, Jan. 19).

Ancient and modern tactical strategy differ little in the basic concept of the right weapon in the right place at the right time. The difference today, however, is that so much can happen in so many places at the same time that human beings get in their own way when they attempt to cope with what has been called the "barrier of information processing." Deployment of available weapons must get under way in seconds rather than minutes when the problem is air defense.

• **To handle the problems** of air defense, the Massachusetts Institute of Technology was asked in 1951 by the U.S. Army, Navy and Air Force to organize an all-out technological attack. To do this the M.I.T. Lincoln Laboratory was organized. The decision to organize Lincoln followed the report and recommendations of an Air Force-appointed group known as the Air Defense Systems Engineering Committee (ADSEC).

Now the largest current project at Lincoln is SAGE. The system was conceived as the means for releasing men for the job they can best do: make decisions in the face of an overwhelming mass of information that modern radar and other communication techniques can collect in a short time. To do this through SAGE, two modern electronics techniques stand out as automating elements which reduce human effort in sorting and displaying information and permit it to be broken into manageable parts.

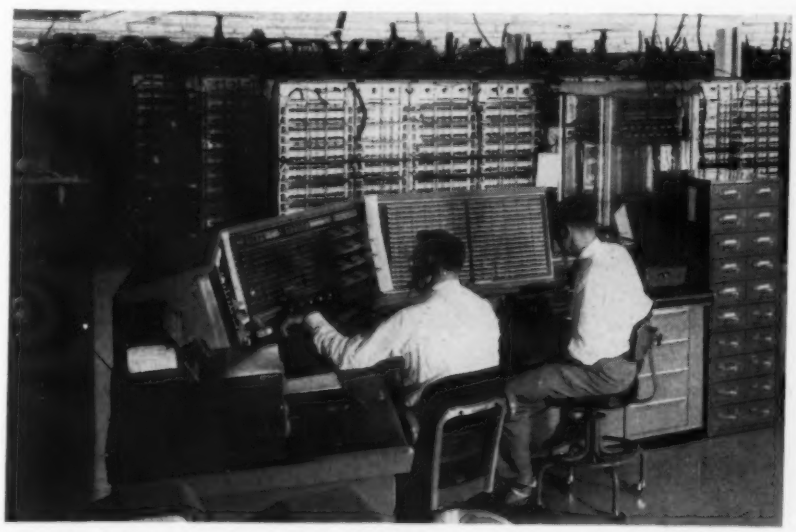
In line with the trend in handling business and engineering data, a data-processing machine takes over much of the sorting and division of work in SAGE. Radars collect the information.

Early model display consoles of a SAGE direction center. The large cathode-ray tube in each unit is a Charactron tube that draws pictures and writes in Arabic letters and numbers. On the upper right of the console in the foreground is a pistol-shaped light-gun used to instruct the computer. Latest models of these units carry many more pushbutton controls together with a Typotron, "electronic typewriter" tube, of small diameter.

Radar display techniques communicate the information to human controllers.

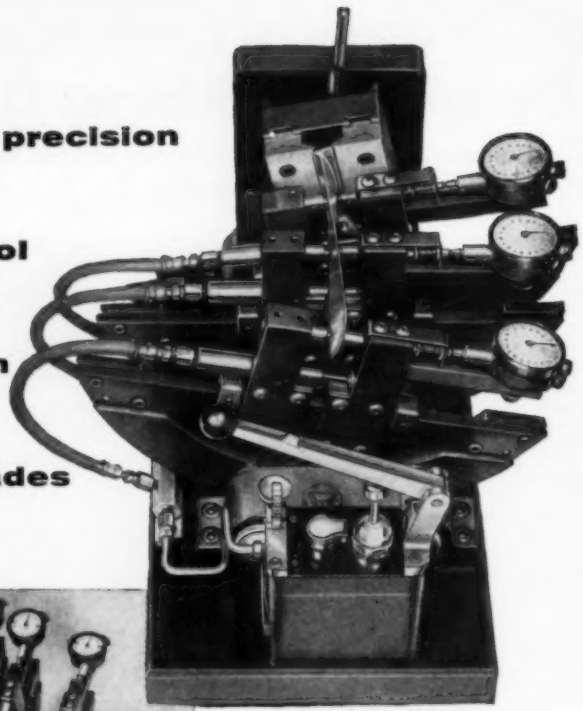
• **Air defense data** from radars has been a prime source of timely information on aircraft movements for over a decade. However, the limited range of a given radar meant it was but one "building block" as a source of information. As an attacking force moved beyond its range it had to let go of that particular situation while another radar took over.

As information developed it was sent by telephone to a control and warning center. From there commands were given for weapons deployment. Speed of information-processing was the index of an effective job of defense, but the

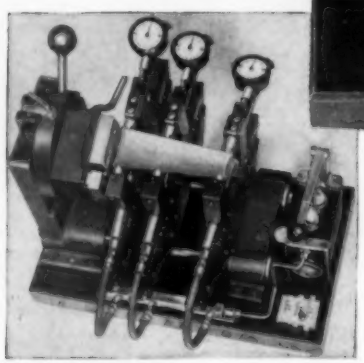


International Business Machines Corp. AN/FSQ-7 computer and its maintenance console. This machine processes data fed to it from many sources. Console is used to check operation and to feed special instructions to the SAGE system. Work is in progress to transistorize this computer design, which now occupies thousands of square feet of area.

perfect precision thickness control for mass production of jet engine blades



Checks Thickness



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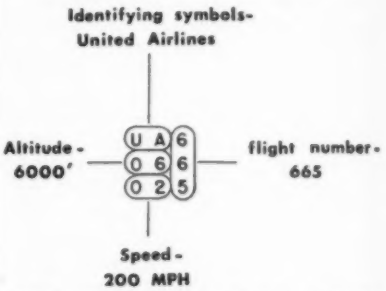
speed of attack which is now possible set a natural limitation to human handling of the information.

Now, with SAGE, overlapping rings of radar coverage can blanket an area with information-collecting sources, and in turn these rings are linked by telephone land lines or UHF radio relay links to an operations center. The land-based radars are of varying power and detection range. Some are called "gap-fillers" since they give coverage in the "blind spots" of the bigger radars or fill small holes left between the long-range radars.

• **Such a system** now exists in the New England area and is called the "Cape Cod" system. It is part of the experimental direction center located at Lincoln Laboratory in Lexington, Mass. From the Cape Cod network and other



Nine-character target-format as it could be displayed on a Charactron tube to an operator using for civil air traffic control.

sources, such as height-finding radars, Texas Towers, picket ships, airborne radar in early-warning planes, Ground Observer Corps, CAA-filed flight plans and weather stations, information is fed to the Lexington center.

The largest digital computer ever built is located at the center. Located in a windowless, reinforced concrete blockhouse, the machine acts as the integrating "brain" for the information it gets, stores, shuffles and presents when addressed by a human operator.

Information is presented to operators on two types of cathode-ray tubes installed in the consoles. Adjacent to the tubes are rows of pushbuttons. The central tube is a 19-inch Charactron developed by Convair Division of General Dynamics Corp. This tube is different from ordinary cathode-ray tubes in that it uses an electron beam forming matrix between the electron gun and the tube screen. The matrix contains Arabic alphabetical or numerical character-shaped openings through which the beam passes. After passing through the openings the shaped beam may be directed to any desired point on the tube face.

Electronic Typewriter Used

• **Another type** of tube known as a Typotron also carries a matrix inter-

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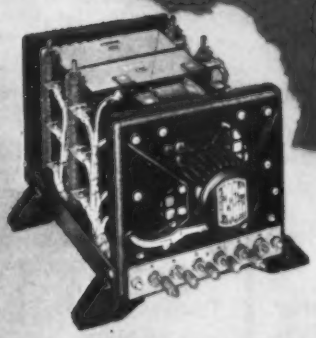

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nally. This tube performs as an electronic typewriter for rapid display of messages to the console operator. The Typotron was developed by Hughes Aircraft Corp. and one of these tubes is part of each SAGE console display.

It is on these tubes that the operating personnel can see a display of air and ground situations for the area under SAGE surveillance. For example, the system would work like this:

Suppose a force of aircraft breached the outer defense ring. Within a few seconds after being detected, the computer would store information on their courses. Theoretically the computer would know whether they are friendly or unfriendly aircraft. How this is done was not disclosed, but information might come from a transponder in the aircraft, ground observer Corps, investigating aircraft, or from previously filed flight plans stored in the computer's magnetic core or rotating-drum "memory." The magnetic core memory was first developed at Lincoln Laboratory.

Within less than a minute after detection, and using information from the radars, a complete file of information would be available to an Identification Officer in the center. Final identification is his responsibility, and this type of human decision function is the reason for SAGE's "semi-automatic" description. The identification officer selects a single or a number of "Weapons Assignors" to organize the attack against the enemy. Having been assigned to a given area situation, the weapons assignor's console Charactron display would show the aircraft assigned him as targets.

Groups of alphanumerical characters called a "target format" identify each plane, show its speed, range, altitude and perhaps the type of aircraft. A vector line with an arrow-head shows the course of each aircraft. Also shown on the weapons assignor's scope would

Simplified version of a SAGE display showing the location of three airfields, the coastline of the San Francisco Bay area, and nine-character target-formats for twelve aircraft. Potentially, one tube can show hundreds of aircraft.

be geographic references such as the limits of a sector or sub-sector, locations of airfields, anti-aircraft gun sites, Nike installations, long-range missiles sites such as that for the Boeing Bomarc, now under development. Some indication of the computer's ability to "think rapidly" is shown by the existence of symbols on the "WA's" scope that indicate to him how long it will take for interceptors from given bases to intercept the enemy.

• **At this point** the WA makes his decision about the weapons to be employed. He directs an "Intercept Director" in charge of those weapons to take over particular aircraft. This is all done with pushbuttons and by "typed" instructions that appear on the Typotron tube. Each intercept director sees a particular situation assigned to him. From this point on the "ID" only monitors the action, since after he signals his weapons to start the attack those weapons are directed by computer-generated signals.

In the case of interceptor aircraft the signals are sent through a radio data link. In the final phase of the attack, airborne equipment such as the Hughes Aircraft Corp.'s fire control equipment takes over and the computer "lets-go" of the plane. Nike missiles are not believed to be under remote control of the SAGE system at this time, but Bomarc will be.

As the attack develops, the Direction Center Commander and his assistants have a full view of the situation on their Charactrons. If they wish more detail of a certain area they can push a button on the console for an expanded view of a small area. Also, they can instruct the computer to take some action about a certain point in the situation. This is done by aiming a light-gun containing a small photoelectric cell at a certain area on the Charactron face.

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Lockheed plane equipped with range- and height-finding radars. From far out over the Atlantic ocean, information is fed to the SAGE computer from planes like this to extend the range of SAGE's detection ring.

tied by electric cables to the computer. One use of the gun might be to cause a small circle to surround a desired target format. This would be analogous to a pointer in the hands of a lecturer and would serve as an attention-getter for other operators.

U.S. Divided into 8 Sectors

As presently planned, SAGE will consist of eight sectors and 32 sub-sectors divided to cover the entire U.S.A. The basic geographical unit is the sub-sector command post. As revealed during a demonstration at Lincoln Laboratory, sub-sectors will use smaller computers which are reportedly being built by the Burroughs Adding Machine Co. At these posts will be a large board display on which is projected the sub-sector situation. A staff on hand will be composed of a Sub-sector Commander, Director of Operations and Weapons Experts. The relationship between sectors and sub-sectors was not stated, but the main "brains" or computer is at the sector location.

• **At the demonstration,** the display board arrangement was very similar to the system sponsored by the Air Navigation Board and proposed by the Bell Telephone Laboratories for air traffic control evaluation study (AMERICAN AVIATION Nov. 7, 1955). A sketch of the sub-sector post layout was shown. It included a position identified as being for a Civil Aeronautics Administration controller. This is probably in-line with AF thinking on the ultimate full application of SAGE.

Already the subject has come up as a matter for Congressional investigation. Rep. John McCormack (D.-Mass.) called attention recently to recommendations of the Harding Study group that urged coordination of the civil and military systems of air traffic control as worthy of exploration. The SAGE system as known thus far fits well into recent air traffic control concepts using radar as a prime source of information (AMERICAN AVIATION July 19, 1955).

The computer for the Lincoln center was made by the International Business Machines Corp. and is known as the AN/FSQ-7. IBM is producing computers for air defense at its Kingston, N. Y. plant. Provision is made for introducing punched-card information into the system. Their use has not been explained in detail. However, the cards would provide one means of storing flight plan information on civil aircraft. Stored in the system, such information would enable the indentification officer to positively identify regular flights. At this time, the cards are being used to "program" the computer. This might mean simulation of situations to test the system.

Other companies which have been closely associated with SAGE are Bell Telephone Laboratories, Burroughs Corp. Research Center, Rand Corp., Western Electric Co., Hazeltine Electronics Corp. and Bendix Aviation Corp. were also credited by Dr. George E. Valley, Jr., Associate Director of Lincoln Laboratory, for producing parts of the system.

• **Lincoln Laboratory** is now headed by Dr. Marshall G. Halloway, a nuclear scientist who came from Los Almos Scientific Laboratory. The prime contract for the system is with the Air Force, although the work is supported by the three armed services. Logistical support for system testing is provided by the Air Force Cambridge Research Center located at nearby Hanscom Field, and the 4620th Air Defense Wing is stationed there to provide for the operational requirements of SAGE.

System Being Expanded

Although still not completely evaluated, the system is being expanded.

(*Continued on Page* 56)

Republic's F-84F Thunderstreak and RF-84F Thunderflash

Photo courtesy of Republic Aviation Corp.

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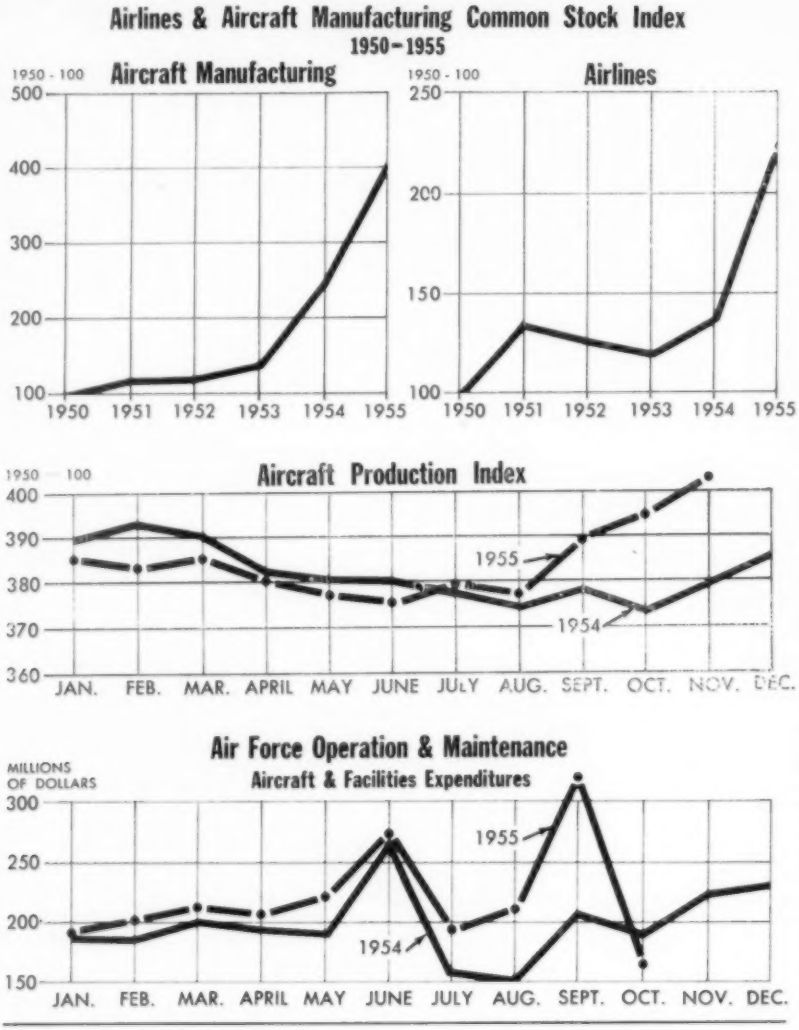


(*Continued from Page* 53)

Two new facilities at Syracuse, N. Y. and one near Fort Dix, N. J. have been discussed as being under construction. Final evaluation is expected to take place this summer. Relationship between parts of the system is such that as an air battle moves out of the area served by one computer, all information pertaining to each aircraft is transferred automatically to the computer of the adjacent area.

Fail-safe operation of the computer has been considered. Each computer is a dual system, so that if one section breaks down, the other immediately takes over the job.

• **The Air Force** will not disclose whether the SAGE system is presently linked to the radar networks in the far north and central Canada. However, it is believed the system is tied into the Pine Tree line running along the Canadian-American border.

The idea of using what is now known as "forward-scatter" of radio waves was proposed originally by scientists meeting at M.I.T. The idea was to open up the very-high-frequency channels to long-range use. Formerly they were considered useless for long-distance transmission. In 1951, Lincoln Laboratory-sponsored operation of a forward-scatter station by Collins Radio Co. Since the success of that study, forward-scatter techniques have been extensively applied to air defense and other uses.

The Air Force has estimated that 25,000 circuits will be needed to link the SAGE system together. These will be leased facilities from private telephone companies and will include land lines and radio relay links already in use and new facilities to be built. Estimates show the costs of commercial communication service required by SAGE may run as high as $240 million annually. Contracts for new facilities built by the telephone companies would provide for a 10-year leasing period in order for the company to amortize new facility costs. This might mean a cost of $2.4 billion for the contract period.

Last year the AF explained to the Senate Sub-committee of the Committee on Appropriations that communication service for SAGE will "not be available until 1957" and "not until 1958 and 1959" will the AF budget for such service become large.

How SAGE, depending largely upon radio wave propagation for its operation, will fare in the light of successes claimed for radio countermeasures jamming devices is not known. According to a Lincoln Laboratory spokesman, the jamming problem is one on which much effort is being spent. But speaking of the continental defense of the United States, he said: "We are faced with the most involved and complex problem ever set before anyone. We must get SAGE installed as soon as possible."

Electronotes

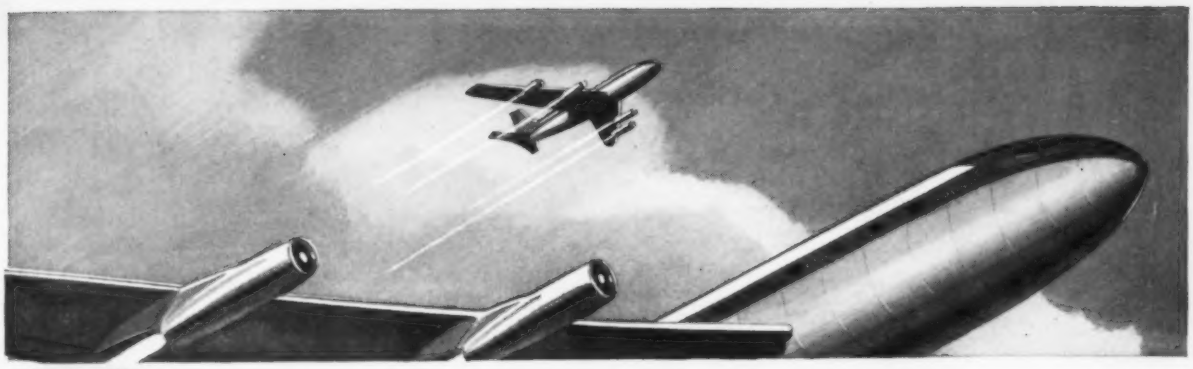
• **"Jerkmeter"** is the name of a new barium-titanate transducer the National Bureau of Standards has developed for studying the action of the human heart. The instrument gives an output proportional to jerk, the time derivative of acceleration. It is being used in research by the CAA to study the relationship of jerk measurements and correct diagnosis of heart conditions.

• **Yardney Electric Co.** has a new battery designated HR-72V that was used to start the Sikorsky XH-39 gas turbine helicopter. With a capacity of 75 ampere hours, the battery weighs 53 ounces and occupies 46.37 cubic inches.

• **Collins Radio Co.** plans to market heat-dissipating shield for vacuum tubes. After evaluating many types of tube shields for bulb temperature reduction, Collins found a corrugated metal shield liner that reduces bulb temperature about 50% and is said to reduce tube failures from heat to about one-half the former value.

• **Bendix Aviation Corp.'s** net income for the fiscal year 1955 was the highest on record for the company. Aviation products amounted to 63% of the 1955 output and production of defense items declined to 69% of total output from the previous year's 77%.

• **Convair** is replacing the IBM calculating machines with which it pioneered in the use of such equipment for reduction of supersonic wind tunnel and jet engine data when it leased the old machines in 1946. The latest IBM 650 data processing machine will replace the former equipment.



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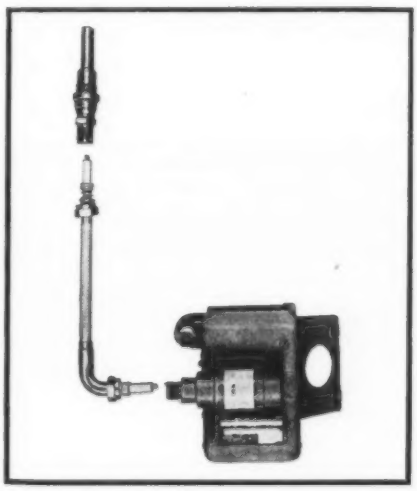

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That's why from blueprint stage to field service follow-through you can depend on Bendix—the most trusted name in ignition—for the best in jet ignition for today's planes or tomorrow's plans.

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BENDIX AVIATION CORPORATION,
SIDNEY, NEW YORK

Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

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Bendix
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Circle No. 24 on Reader Service Card.

one of the petroleum industry's biggest headaches

. . . complaint of contaminated aviation fuel even though rigid checks prove fuel to be contaminate-free when it leaves the refinery.

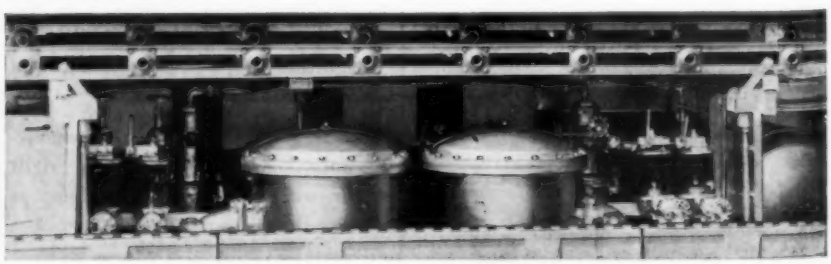
modern filter research has found the answer

. . . and that answer is bulk filtration with Purolator MICRONIC* filters right at the point of delivery. Purolator's modern research and engineering laboratories have developed the world's finest airport bulk filtration equipment. And, along with it, they have developed valuable ideas for using this equipment to guarantee your customer relations. For details, write Purolator Products, Inc., Rahway, N. J., Dept.B2-22.

*Registered Trade Mark

TYPICAL INSTALLATIONS

AT AIRPORT FUELING RACK
(ten PAG-300 MICRONIC Filters)



IN SIDE COMPARTMENT OF AVIATION FUELING TRAILER
(two PAG-150 MICRONIC Filters)

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

Circle No. 25 on Reader Service Card.

introducing

the new turbo-prop

VISCOUNT 810·840

cruising speeds up to 400 miles per hour!

The new Vickers Viscount 810·840, recently ordered by Continental Airlines for delivery early in 1958, is designed to cruise up to 400 miles an hour at 20,000 feet. Yet it will be *even more* economical and profitable to operate than the famous Viscount 700 series, which has set new speed and traffic records for progressive airlines all over the world.

The Viscount 810·840, with a capacity of up to 70 passengers, will be the ideal aircraft for medium-haul, high-density routes. Its advantages include higher productivity because of higher speed; expanded seating capacity; greater economy through its advanced Rolls-Royce Dart R. Da. 7 and R. Da. 8 turbo-prop engines; and relatively low first cost.

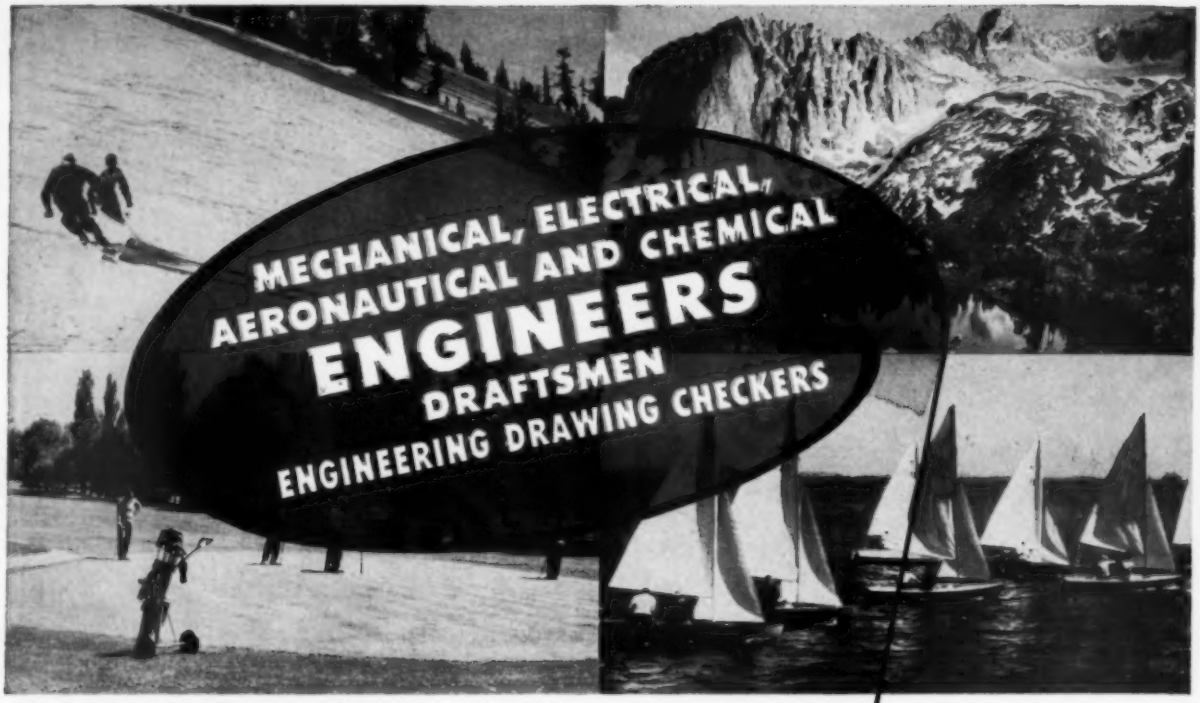
Behind the new Viscount 810·840 stands the great name of the Vickers Group—internationally famous as makers of aircraft, ships, industrial machinery and precision equipment.

United States Representative: Christopher Clarkson, 10 Rockefeller Plaza, New York 20, N. Y.

turbo-prop

VICKERS VISCOUNT

VICKERS-ARMSTRONGS (AIRCRAFT) LTD.
Weybridge, England



Aerojet-General, America's leader in rocket propulsion, announces the activation of its new Liquid Rocket Plant near Sacramento, California. Devoted to research, design, development and manufacture of large liquid-propellant rocket engines, the new plant is the world's largest industrial establishment of its kind.

Operations are starting now on a permanent basis. Unparalleled "ground-floor" opportunities exist for engineering personnel and draftsmen at all levels of experience.

A subsidiary of The General Tire & Rubber Co., Aerojet combines the stability and resources of a large industrial organization with the vigorous forward thinking of the youthful rocket industry. Nowhere is professional and economic growth so highly assured.

Sacramento, California's capital and one of the West's fastest-growing metropolitan areas, offers the finest in contemporary living, with excellent housing, schools, recreation facilities, and major shopping centers. Superb year-round temperate climate and proximity to the lakes and national forests of the West make it an outdoor man's paradise.

For further information please write or call the *Personnel Department, Liquid Rocket Plant, Aerojet-General Corp., Sacramento, Calif.* Your inquiry will receive immediate, confidential attention.

A *ttractive living*

E *xcellent fringe benefits*

R *elocation expenses*

O *pportunity unlimited*

J *ob security*

E *ngineering challenge*

T OP SALARIES

Start with 28 Sacramento parks and three golf courses, all used year-around. Add the Sacramento and American Rivers for boating, picnicking, and for striped bass, salmon and steelhead fishing. Add two and a half million acres of valley lands teeming with pheasants, ducks, and geese. Then add the foothills of the Sierra, the ghost towns of '49, and the nearby mountain resorts. Ski, if you like, at famous Sugar Bowl and Squaw Valley, from December through May. Hundreds of Sacramento-area residents own summer homes near these resorts and at beautiful Lake Tahoe, or beach homes in the Santa Cruz-Carmel area. From this Heartland area the High Sierras and sunny Pacific beaches are nearly equi-distant. [illegible] trips or weekends!

Aerojet-General CORPORATION

A Subsidiary of The General Tire & Rubber Company

THE GENERAL TIRE

AZUSA, CALIFORNIA

SACRAMENTO, CALIFORNIA

MORE POWER FOR AIR POWER

Circle No. 26 on Reader Service Card.

New Products and Processes

PLASTIC TOOL-MAKING PROCESS

A thin plastic film, stretched over a master pattern, is being used as an effective parting agent during casting or laminating of plastic tools by **Republic Aviation Corp.**

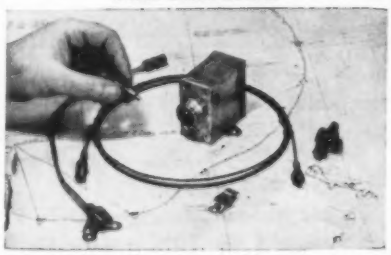
Republic's research program in plastics has yielded more than 800 different laminate plastic parts and hundreds of light, economical tools used in the production of its F-84F Thunderstreak.

One problem in the manufacture of plastic tools has been the tendency for plastic resins to stick to the pattern on setting. Sometimes this necessitates reworking the pattern or extra finishing of the tool. Using their new method, before pouring or laminating the plastic material, Republic's tool-makers stretch a vinyl plastic film .005-in. thick over the pattern and tape it down snugly. When cooled, the pattern separates cleanly from the cast plastic.

When the film is stretched over concave surfaces, a vacuum draws it into place with wrinkling. The film can be removed from a pattern and used many times.

Circle No. 150 on Reader Service Card.

FIRE DETECTOR



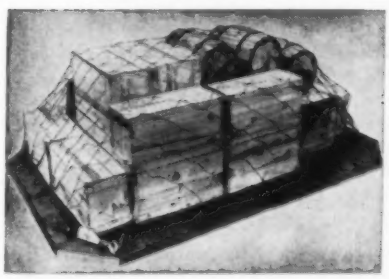
A new fire detector developed by **Walter Kidde & Co., Inc.** gives a signal reporting an overheated nacelle and later a fire alarm if the condition worsens.

The detector operates on both the fixed-temperature and rate-of-temperature rise principles. To prevent false alarms due to sudden operational temperature rises when the engine is being started, the detector permits overheating or fire alarms only after the maximum normal temperature has been exceeded in a nacelle.

The unit includes a fire-sensing element and a control unit employing transistors which interpret electrical signals from the sensing element. If the normal operating temperature range within a nacelle is known to be —65° to 350°F, the control unit would be pre-set at 390°F so that an overheat signal is actuated at that point. At 600°F the actual alarm would go off.

Circle No. 166 on Reader Service Card.

STEEL CARGO NET



Eastern Rotorcraft Corp. has added a new steel cargo net to its line of tie-down equipment.

Designated Model A-2, the net is adaptable for a variety of cargo-handling jobs. It is designed for four major purposes: (1) to secure low density shipments; (2) to form compartments in cargo areas; (3) to provide a safety barrier; (4) to carry cargo.

A diamond-shaped grid pattern permits elongation of the net in either direction. An arrangement of rings and hooks permits the joining of two or more nets to make larger nets for handling greater loads or covering larger areas.

Circle No. 161 on Reader Service Card.

PROPELLER-BALANCING KIT

Genex (General Airmotive Co.) offers a suspension-type propeller-balancing kit, designated Model 3A-100, that meets Navy and Air Force specifications.

The kit includes a balancing arbor assembly with wrench, a set of seven adapters for Nos. 10 through 60 spline propellers and a detailed instruction sheet. It measures 6 x 12½ x 30 in., occupies 1.3 cu. ft. of space. Gross shipping weight is 55 lbs.

Circle No. 159 on Reader Service Card.

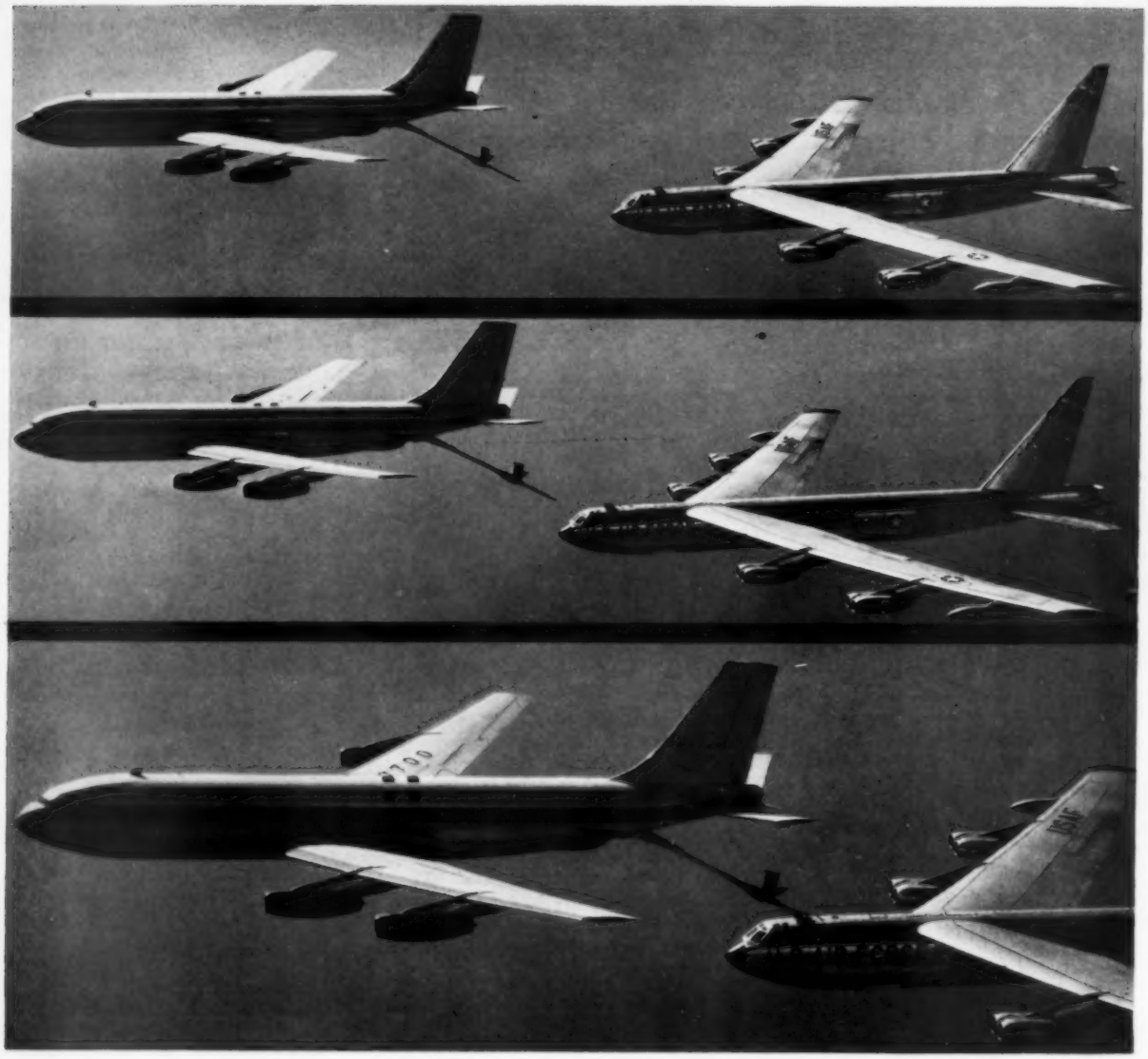
BATTERY HEATER/CHARGER

Fox Products Co. has announced a new type of battery heater/charger designed to overcome difficulties inherent in operating lead-acid storage batteries at extremely low temperatures.

Designated Model 11, the unit was developed originally for use by the U.S. Army in Korea. However, it has many other applications, as in aircraft operation.

According to the manufacturer, storage battery discharge is possible at temperatures as low as —60°F. At such temperatures, the charging process becomes complex because of the frozen condition of the electrolyte. If charging is attempted, the highly viscous electrolyte restricts escape of the hydrogen gas generated during charging. Resulting internal pressures can damage the battery. Pre-heating of the electrolyte thus becomes necessary.

In the Fox battery heater/charger the battery itself is used as the heat source. Alternating current is passed through the battery by attaching the



Jet-to-jet refueling at 500 miles an hour

The Boeing jet tanker prototype is pictured above making a refueling contact with an eight-jet B-52 bomber.

This operation is part of an intensive test program in which every detail of America's first jet tanker, the Boeing KC-135, will be proved out well before the first production model rolls off the line.

For more than a year the Boeing prototype has been accumulating the kind of data obtainable only in actual flight. Resulting developments and design refinements have already been incorporated in the KC-135s now taking shape in Boeing's Renton, Washington, plant.

Besides proving out the airplane itself, the prototype makes it possible to test thoroughly the streamlined new Boeing Flying Boom, and all aspects of jet-to-jet refueling at speeds above 500 miles an hour, and altitudes over 35,000 feet. This means that when deliveries of the KC-135 to the Air Force begin, the airplane will be operationally proved. And it will be equipped with a flight-tested jet-speed refueling system.

The prototype has, during its hundreds of hours of grueling test flying, performed beyond expectations. This in part is a result of Boeing's unique experience designing and producing more large, multi-jet aircraft than any other company in the world. These include the B-52 eight-jet bomber, and more than 1200 six-jet B-47 medium bombers. In addition, Boeing pioneered the development of aerial refueling. It has built more than 600 Boeing KC-97s, the standard propeller-driven tanker of Strategic Air Command.

This is the unequalled background that gives assurance to the Air Force, and to the nation, that the Boeing KC-135 will be another outstanding, dependable aircraft.

BOEING

AMERICAN AVIATION

NEW PRODUCTS

heater directly to battery terminals. Designed for use with either 6- or 12-volt batteries, the Fox unit can be set to perform any one of three functions: (1) maintain the battery at desired temperatures automatically; (2) charge battery at a preselected rate; (3) simultaneously and automatically heat and charge battery at proper rate.

Circle No. 149 on Reader Service Card.

TACHOMETER

A new tachometer produced by **Metron Instrument Co.** not only indicates revolutions per minute but actuates self-contained power relays that signal over-speeds and under-speeds.

This tachometer may be used for sounding alarms, turning on light signals, stopping or starting equipment, opening or closing valves, controlling speeds and other applications.

High and low pointers are independently adjustable. They act as a single-pole double-throw switch, with the regular speed pointer acting as the switch center arm.

The tachometer is available with any one of 48 different scales.

Circle No. 151 on Reader Service Card.

PRINTED CIRCUIT RESISTORS

Resistance Products Co. is producing a line of Type P wire-wound resistors for use with printed circuits and with tolerances ranging from 1 to 0.05%. The units are single ended for rapid mounting on printed circuit panels with no support other than the wire leads needed.

Designed for safe operation at full rated load in ambient temperatures up to 125°C, the resistors are made with epoxy resins and resistance wire with high-temperature insulation. Sizes are available from 1/10 watt to 1 watt. The line is available in six sizes from ½-in. in diameter and ⅜-in. long to ⅜-in. diameter and ¾-in. long. Resistance values range from 0.40 meg-

FILTER ALL ENGINE OIL

Save Hundreds of Dollars Every Overhaul

Replacement parts cost $600 to $2,500 less . . . every 1,000 hours . . . when engines are protected by Winslow full-flow filters. More than two years of operation, with installations on Douglas DC-3 and DC-4, Boeing Stratocruiser, Lockheed Lodestar, Stearman, and other aircraft, prove the efficiency of Winslow filters. Only Winslow has the patented CP* elements, that filter *all* the oil. This equipment is inexpensive, light in weight, easy to install. Please write for engineering data and filter recommendations.

The used CP* elements pictured are from an R-4360 engine on a transpacific Stratocruiser. In 1,000 hours service, 72 pounds of solid contaminants were removed from this engine. An average saving of hundreds of dollars in replacement parts and labor is indicated.

CP* (Controlled Pressure) is protected by patents and trademarks

WINSLOW FILTERS

Winslow Engineering Company • 4069 Hollis St., Oakland 8, California

Circle No. 27 on Reader Service Card.

Introducing another NEW B&H Instrument...

TAKCAL

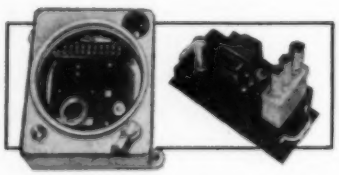
· COMPACT
· LIGHTWEIGHT
· RUGGED

Reads Jet Engine Speed to Guaranteed Accuracy of 10 RPM in 10,000 RPM (±0.1%)

The new B&H TACKAL incorporates a refinement of the frequency meter principle. It operates in the low (0 to 1000 cps) range, reading the frequency of the tachometer generator on a scale calibrated in percent RPM corresponding to the engine's RPM. In addition the TAKCAL checks the tach system. The TAKCAL circuit and tachometer are parallel so that readings can be made simultaneously to determine the accuracy (or inaccuracy) of the aircraft's tach system. The TAKCAL operates during the engine run to properly set up engine controls for maximum economy and safety.

Originally developed as a component part of the J-Model JETCAL ANALYZER, the TAKCAL is now available as a separate unit for use with all earlier models of the JETCAL TESTER.

The TAKCAL operates accurately in all ambient temperatures from –40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.



Explosion-proof TAKCAL for special applications. Measures 200 to 7500 RPM, direct reading, with ±0.1% accuracy.

For full information write or wire . . .

TAKCAL

B & H INSTRUMENT Co., Inc.

1009 Norwood • FORT WORTH 7, TEXAS

Circle No. 28 on Reader Service Card.

NEW PRODUCTS

ohms in the smallest size to 3 megohms for the largest unit. The manufacturer says the Type P line meets test requirements of MIL-R-93A, Amendment #3.

Circle No. 168 on Reader Service Card.

WING-FLAP ACTUATOR

Sargent Engineering Corp. has developed a ball-screw actuator for the wing-flap system of a large military transport now in production. Two problems had to be solved in the development of the actuator: the ball-screw had to be designed so that it could operate without lubrication and a system had to be designed to overcome malfunctioning of the normal stroke-limiting device.

A resilient non-jamming stop was incorporated in the nut and screw. Engagement of the nut and screw during stopping is accomplished tangentially to avoid imposition of any axial load on the balls. This is said to eliminate jamming and "brinelling" of the balls. A series of cantilevered reeds deflect during stopping so as to absorb the kinetic energy of the system and avoid the generation of high-peak stopping loads.

Circle No. 152 on Reader Service Card.

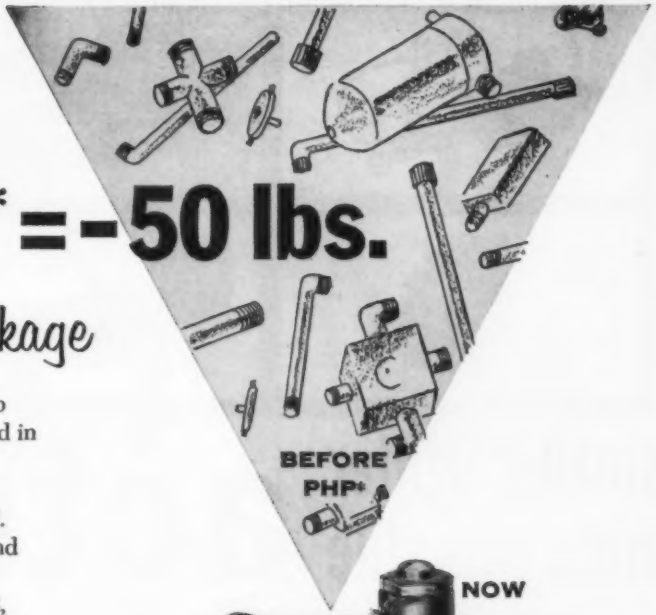
KEYER-SUBCARRIER OSCILLATOR

A new type DKO Keyer-Subcarrier Oscillator that permits Pulse Width multi-channel coding on a single channel in several types of standard FM/FM telemetering systems has been announced by **Applied Science Corp. of Princeton.**

When used with a suitable PW commutator, the unit permits PW multiplexing and coding of a large number of data channels on a single 40

B-52 + PHP* = -50 lbs.

*Parker Hydraulic Package



Aircraft manufacturers are constantly trying to upgrade their products. Their engineers are engaged in a never-ending search for better equipment. In this search weight is always an important factor. Every pound—every ounce—saved is a step forward.

Parker's latest contribution to this upgrading and weight reduction is a Hydraulic Components Package, ten of which will be used in the new B-52, with a savings of over 50 lbs. per plane. Each package contains: two check valves, one depressurizing valve, one by-pass valve, one restrictor, one filter and filter bypass.

In packaging these components six housings are eliminated; fewer lines, fittings and mounting provisions are used; maintenance is greatly reduced; installation costs are cut; valuable space is saved; greater safety is achieved as fewer joints mean less potential leaks and weight is *greatly* reduced.

Similar packages are being designed by Parker for other installations.

Let a Parker Team help you

A Parker Team is available to assist you in designing a Hydraulic Components Package to meet your specific requirements for existing or proposed models. If you have any problem in hydraulic, fuel or check valves or are beginning system design get a Parker Team on your staff.

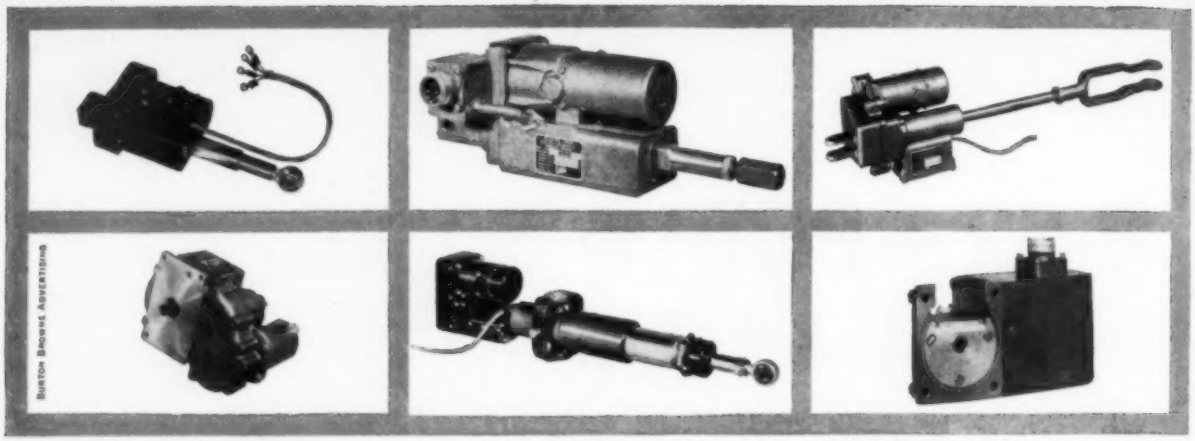
check valves hydraulic valves fuel valves accumulators

Parker

Hydraulic and fluid system components

Parker Aircraft Co. Los Angeles 45, Calif. • Cleveland 12, Ohio
(subsidiary of the Parker Appliance Company)

Circle No. 29 on Reader Service Card.



smaller lighter more versatile actuators

Oster®

A wide variety of smaller, lighter, more versatile linear and rotary actuators. One can be adapted to your specifications.

- 25% smaller, lighter because gear train and motor blended into single, unique homogeneous unit.
- 180,000 #/in.² yield strength steel used in all gears.
- New high stability limit switch can be adjusted internally or externally.
- Unique design positive mechanical stops.
- Exclusive overload clutch dissipates extremely high forces in "impact" stopping.

LINEAR ACTUATORS

- 0.0018" end play in screw and nut. Specially designed acme screw made to AGMA pitch diameter standards but held to much closer tolerances than specified by any known standard today.
- Exceptionally long life due to new different continuous self-lubrication on acme screw.
- Rate adjustable from 1.6" to 30" per minute.

ROTARY ACTUATORS

- 3:1 to 523:1 gear ratio range available.
- 60° to 360° travel.
- 2° maximum backlash on output shaft.

TYPE	LINEAR	LINEAR	LINEAR	LINEAR	ROTARY	ROTARY
PART NO.	ACT-3080	ACT-2425	ACT-3047	ACT-2439	ACT-2274	ACT-2408
WEIGHT	1.3# WITH 1.5" STROKE	3.1#	3.25#	3#	5#	2.2#
NORMAL OPERATING RATE & LOAD	1500# IN./MIN.	10.5 IN. PER MIN. 200# LOAD	2.9 IN. PER MIN. 10# LOAD	0.5 IN. PER SEC. 240# LOAD	8 RPM AT 250# IN.	200 RPM AT 3# IN.
TEMP. RANGE	−65° F TO 300° F	−65° F TO 360° F	−60° F TO 250° F	−65° F TO 250° F	−65° F TO 160° F	−65° F TO 260° F
VOLTAGE	28 V.D.C.	26 V.D.C.	26 V.D.C.	28 V.D.C.	27 V.D.C.	27 V.D.C.

Write for further details, stating your requirements.

Other products include Servos, AC Drive Motors, DC Motors, Motor-Gear-Trains, Fast Response Resolvers, Servo Torque Units, Synchros, Reference Generators, Tachometer Generators, and Motor Driven Blower and Fan Assemblies.

John Oster MANUFACTURING CO.
your rotating equipment specialist

Avionic Division
RACINE, WISCONSIN

Circle No. 30 on Reader Service Card.

NEW PRODUCTS

kc or 70 kc subcarrier channel. Requiring 25.2 volts at 0.3 amperes and 150 volts dc at 10 ma, the unit accepts 0 to + 5-volt signals sampled at a total of 900 times a second. The Model DKO-10 measures 4¼ x 7/16 x 1⅞ in. and weighs 8 oz.

Circle No. 169 on Reader Service Card.

PRESSURE-SENSITIVE TAPE

Minnesota Mining and Manufacturing Co. has developed a pressure-sensitive tape intended primarily to reduce the sound level inside aircraft.

"Scotch" brand sound-damping tape No. 435 is designed specifically for applications where a high ratio of noise reduction to unit weight is desired. It is a laminate of two layers of aluminum foil coated with a long-aging adhesive.

The company expects the tape to be used widely in the aircraft industry for lining fuselage sections of commercial airliners, private planes and the remodeling of executive type aircraft.

Damping efficiency is said to be 92 db/sec./lb. sq. ft. at 0°F or 45.5 db/sec./lb. sq. ft. at 70°F.

Circle No. 153 on Reader Service Card.

POWER SUPPLY CONVERTER

Type 3-134 power supply, produced by **Consolidated Electrodynamics Corp.**, provides conversion of 200-volt, 400-cycle, three-phase alternating current to 26-volt direct current.

The unit is designed to permit

Bendix-Friez

AEROVANE* SYSTEM

TRANSMITTER

RECORDER

INDICATOR

CONTROLLER (Windtrol†)

...for measuring wind speed and direction

Here's a wind measuring system of high accuracy for airport, research and testing use. Indicates and records wind speed and direction. Keeps a permanent log of weather conditions. Used by manufacturers for testing operations in which noise or smoke are involved. Controller actuates operating equipment, signals and alarms.

The Bendix-Friez* Aerovane System is available as a complete package. Or, the individual units may be purchased for use with the transmitter.

TRANSMITTER—Detects wind speed and direction. Electrically sends information to indicator, recorder and controller.

RECORDER—Inks the wind speed and direction on time calibrated chart. Has three speeds for 1½-, 3- or 6-inches per hour. Under normal 3-inch-per-hour setting, recorder operates continuously for two-week period.

INDICATOR—Shows wind speed and direction. Illuminated dials, white over black markings for maximum legibility. Calibrated in degrees of compass and miles per hour.

CONTROLLER—Actuates circuits, turns on alarm system, operates other equipment when wind speed and direction reach pre-determined settings. Wind speed and wind direction dials mounted on face. Automatic time delay device compensates for fluctuating wind direction and speed. Time length is adjustable.

Write today for complete information.

*Reg. U. S. Pat. Off. †Trade-mark

Bendix-Friez

FRIEZ INSTRUMENT DIVISION • BENDIX AVIATION CORPORATION
1476 TAYLOR AVENUE BALTIMORE 4, MARYLAND
Export Sales and Service: Bendix International Division, 205 E. 42nd Street, New York 17, N. Y., U.S.A.

Circle No. 31 on Reader Service Card.

operation of dc-type oscillographs in airplanes equipped with ac systems. It may also be used to power other dc equipment.

Output is regulated within a range of 23.5 to 28.5 volts dc for line voltages from 190 to 210, frequencies from 380 to 420 cps and loads from 3 to 20 amperes. The unit weighs 13 lbs., operates in temperatures ranging from —65°F to 150°F, relative humidity to 95% and altitude to 50,000 ft. Technical literature is available.

Circle No. 163 on Reader Service Card.

HIGH-PRESSURE FUEL PUMP

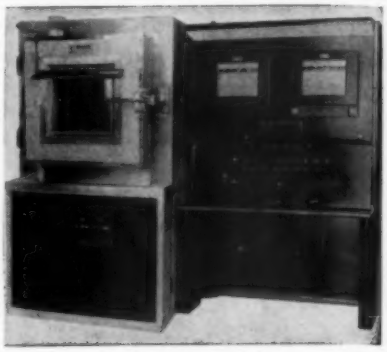
Lear, Inc.'s Lear-Romec Division has announced a new high-pressure fuel pump, Model RR-15460, designed for a gas turbine fuel system.

The pump has a rotary gear, built-in centrifugal fuel booster pump and a mounting pad for gear-driven fuel-meter control. Rated capacity is 9.4 gals. per minute at 6,000 rpm and 700 psi absolute discharge pressure pumping MIL-F-5624, grade JP-4 fuel at 110°F, with 20 psi gauge inlet pressure derived from booster pump. Displacement of gear pump is .52 cu. in. per revolution.

Model RR-15460 has a square, 4-hole mounting flange and splined driveshaft. Aluminum pump body contains inlet port, discharge port and port for relief valve return line.

Circle No. 154 on Reader Service Card.

INSTRUMENT CONSOLE



Tenney Engineering, Inc. has developed a console form of instrument localization for use in conjunction with environmental test equipment.

Shown here with Tenney flight chamber 12STR, the console is a unit in itself, with all switches, dials and contacts mounted on front. It can be "remoted" for any dangerous operation.

Tenney instrument consoles are available in many sizes and configurations to fit a variety of requirements. They are standard equipment with the company's stratosphere, low-temperature and combination models.

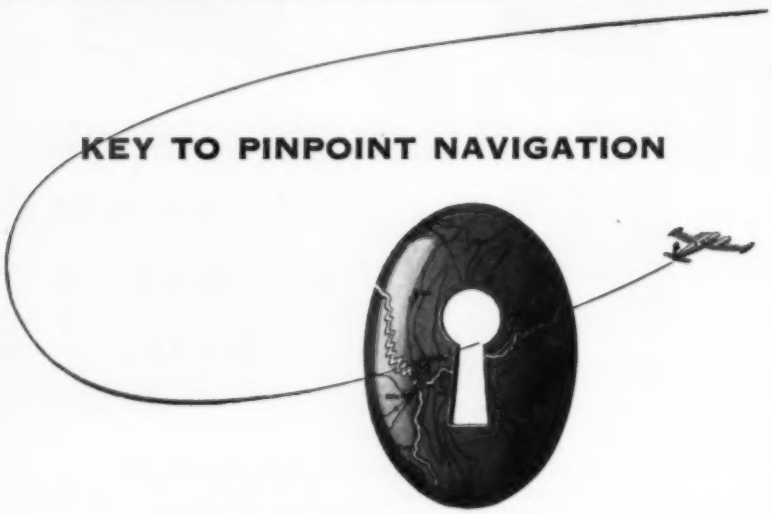
Circle No. 162 on Reader Service Card.

SELECTOR VALVES

Aircraft Products Co. is making a new line of 3-way selector valves for 3,000-psi service that are said to be capable of handling 85% higher flows than conventional models.

The valves are available in two size ranges, Series 6000 for ¼-in. and ⅜-in. tubing and Series 6050 for ⅜-in. and ½-in. tubing. Solenoid-operated, they permit flow in any direction and feature a compact porting configuration. The flow can be reversed between any two open ports without disturbing the flow

KEY TO PINPOINT NAVIGATION



Omni/ILS Plus **ARC's** *New Course Director*

This new and advanced navigation instrumentation system is a complete PACKAGE, consisting of single or dual omnirange equipment, teamed with the new ARC COURSE DIRECTOR.

The COURSE DIRECTOR consists of a computer which gives precise steering data and a compass slaved gyro which provides *stabilized*, accurate, directional information.

The system supplies the pilot with AUTOMATICALLY COMPUTED steering information on all ENROUTE OMNI TRACKS, HOLDING, INBOUND, OR OUTBOUND ILS OPERATIONS, thus providing PRECISE APPROACHES. Complete automatic crosswind compensation is provided for ALL operations.

The computer performs all your calculations and presents correct steering data directly on the cross-pointer meter. The gyro needs no resetting at any time, since precession is completely compensated. *You simply set in your selected course and steer to keep the needle centered.* The system will then either intercept or precisely follow the desired track as required.

So – fly with pinpoint precision – greater ease and increased safety. See your nearest ARC Dealer or write for detailed illustrated data.

Omni Receivers • 900-2100 Mc Signal Generators • UHF and VHF Receivers and Transmitters • 8-Watt Audio Amplifiers • 10-Channel Isolation Amplifiers • LF Receivers and Loop Direction Finders • CD-1 Course Directors

ARC Aircraft Radio Corporation BOONTON, NEW JERSEY

Dependable Airborne Electronic Equipment Since 1928

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On most military and commercial aircraft

Scott
OXYGEN EQUIPMENT

★ Scott Aviation products are known the world over for their high standards of perfection. Whether it's an Aviox portable oxygen unit for your company aircraft or a miniature oxygen regulator for a high speed jet fighter, you can be sure it's the finest possible. For over 20 years Scott creative engineering has been solving difficult problems for military and civil aviation. Our engineering staff is at your service for consultation regarding your particular needs. Inquiries invited.

Scott-Firewel Miniature Oxygen Mask Regulator. Three to four pound weight saving. Requires no panel space.

Scott High Altitude Oxygen regulator for aviation pressure suits.

"Oxygen Console" compact fixed oxygen system for up to five persons.

"Aviox" oxygen system for four in a portable luggage case.

One positive control accommodates up to 50 people with this low-cost, light weight fixed oxygen system.

Scottoramic Face Mask. A new mask concept with unlimited visibility through large one-piece lens.

Dual-Purpose Portable Airline Oxygen unit. Demand regulator for crew, constant flow for passengers.

Constant flow disposable mask. Efficient low-cost, sanitary and comfortable.

SCOTT AVIATION CORP.

212 ERIE STREET — **LANCASTER, N. Y.**

West Coast Office: Fulton-Ventura Bldg., 13273 Ventura Blvd., Studio City, California

Export: Southern Oxygen Co., 15 West 57th Street, New York 19, New York

SINCE 1932 Scott

Circle No. 33 on Reader Service Card.

NEW PRODUCTS

or operating characteristics of the valves.

The Series 6000 valve will handle up to 6 gals. of fluid per minute, as compared with 3.2 gpm for standard ⅜-in. valves. Series 6050, basically a ½-in. valve, is furnished with ⅜-in. ports for use where low pressure drops are required, or where higher rates of flow are encountered.

Circle No. 165 on Reader Service Card.

COLORED SLIDE RULE

A slide rule made of a light alloy in a green-yellow shade that is said to reduce eyestrain and errors in reading is offered by **Pickett & Eckel, Inc.**

According to the manufacturer, white slide rules reflect all collors of the spectrum; blue rays come to a focal point in front of the retina, red and violet rays focus in back of the retina. Only the green-yellow rays focus exactly on the retina, says the manufacturer, thus making it much easier to read fine calibrations.

Pickett & Eckel's slide rules are non-corrosive, non-rusting and are made in 6-in, 10-in. and other sizes, made to order.

Circle No. 167 on Reader Service Card.

Dear Linda-bird:

It's a fine winter day at Dallas — snow up to my antenna-loop and dogs mushing about Southwest Airmotive's flight line toting rum-kegs on their necks, seeking lost aviators. Thank goodness tomorrow's forecast is 99 degrees and dust!

I'm dreamin' how you, as a kid, liked to h'ist your nighty and plant your fat little legs and knobby little knees by the fire, warming your backside. I bet you haven't changed a bit way off at college. Are your ankles still bigger'n your calves? Ho-ho-ho.

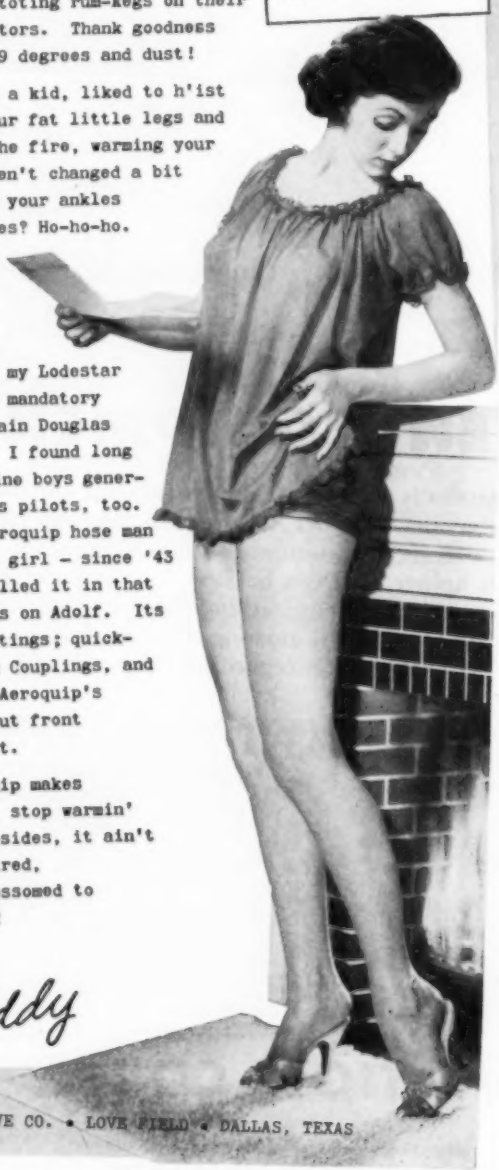
Memory fires are nice, but some others aren't. Today, SAC's putting fire resistant Aeroquip prop feathering lines in my Lodestar per CAA AD Note 55-15-3, mandatory for airlines flying certain Douglas and Lockheed airplanes. I found long ago what's good for airline boys generally is good for business pilots, too. Besides, I've been an Aeroquip hose man like you're a nylon hose girl – since '43 when the Air Force installed it in that heap I flew droppin' eggs on Adolf. Its reusable, detachable fittings; quick-disconnect, Self-sealing Couplings, and overall reliability put Aeroquip's original design as far out front as Jane Russell's T-shirt.

And sweety, until Aeroquip makes a fire-resistant bustle, stop warmin' yours by the hearth. Besides, it ain't ladylike for a brown-haired, hazel-eyed kid who's blossomed to 112 lbs., 5'6", and 18!!

Love,

Daddy

A letter from Daddy
TO: LINDA HENRICH



SOUTHWEST AIRMOTIVE CO. • LOVE FIELD • DALLAS, TEXAS

Circle No. 34 on Reader Service Card.

INTERVALOMETER

Photographic Products, Inc. has developed a new intervalometer, Model N-20, for use in supplying timing pulses for flight-test instrumentation, ballistics, missiles, fire control and other ordnance applications.

The intervalometer supplies 1, 2, 4, 5, 8 or 10 pulses per second, selected by means of a control on the front, and, through use of a stepping relay system, provides five additional continuous intervals of ½, 1, 2, 5 and 10 seconds.

Accuracy of pulse and interval is said to exceed .5%. The unit operates in temperatures of —50°F to 150°F at dc voltages of 20 to 30.

Circle No. 155 on Reader Service Card.

HIGH TEMPERATURE RECTIFIER

A silicon power rectifier that will operate at ambient temperatures up to 200°C is being produced by National Semiconductor Products Division of **Hoffman Electronics Corp.**

The NS-P1 rectifier is 1⅛ ins. in diameter and 1¼ ins. long. Housed in a plated metal case, the rectifier is first of a complete line of high-powered silicon rectifiers scheduled by the manufacturer. Forward current density at 1-volt drop is in excess of 600 amperes per square inch of junction area.

Circle No. 170 on Reader Service Card.

ADF CONTROL HEAD

Electronics Equipment Engineering, Inc., has announced its new Type 150 ADF control head that requires only a 4½ x 4½-in. panel area. The new head was designed to permit maximum utilization of panel space and yet retain an easily read dial face.

The head is available in four models for use with MN62, R5/ARN7, or

Captain Eddie Rickenbacker chooses

Allison Prop-Jet Power for Eastern Air Lines

☆ Serving more United States cities than any other airline ☆

Eastern's new Lockheed Electras—world's fastest, smoothest, most luxurious airliners—will fly at well over 400 miles an hour!

AFTER years of engineering research covering all types of aircraft power units, Eastern Air Lines has selected Allison Prop-Jet engines and Aeroproduct Propellers for our fleet of 40 new radar-equipped Lockheed Electra airliners.

This decision represents a great step forward in Eastern's progress into the jet age, and reflects our conviction that Allison Prop-Jet power, a product of General Motors, is the most efficient and dependable engine-propeller team for the new Lockheed Electra.

This new Allison engine harnesses the vast power of a modern gas turbine to a propeller. It uses less fuel than a straight jet, yet it enables aircraft to fly faster with greater payload than any other propeller-type aircraft engine in commercial use today.

Allison-powered Electras will be in service on Eastern Air Lines routes in the Fall of 1958. Flying at speeds of well over 400 miles an hour, these 66-passenger airliners will offer unprecedented smoothness of flight, a new standard of quiet, restful comfort, and the highest degree of dependability.

We of Eastern congratulate General Motors on this great achievement in aircraft power, an achievement that will help bring the untold benefits of modern air transportation to more millions of people in the years to come.

Eddie Rickenbacker

Chairman of the Board, EASTERN AIR LINES

I AM happy to announce that Captain Eddie Rickenbacker, one of the most highly respected figures in aviation and dean of the air transportation industry, has chosen Allison Prop-Jet engines and Aeroproduct Propellers for Eastern's new fleet of Lockheed Electra airliners.

Captain Rickenbacker's decision is a magnificent tribute to General Motors and the Allison Prop-Jet engine, the first gas turbine engine to receive Civil Aeronautics Administration approval for commercial service.

The Allison Prop-Jet engine is the most advanced power plant of its type and is backed by more than 7 million hours of turbine engine flight time in military aircraft.

In Allison Prop-Jet power, General Motors again demonstrates its leadership in the development of power for all kinds of transportation. In aviation, in motor vehicles, in locomotives and in marine engines, GM has gained the confidence of millions of people who daily depend upon GM power units.

In air transportation, Eastern Air Lines has earned and held the confidence of the traveling public for over 27 years. General Motors and Allison Division are proud to join Captain Rickenbacker and Eastern Air Lines in this great contribution to the future of commercial aviation, national defense and the progress of American-designed and American-powered aircraft.

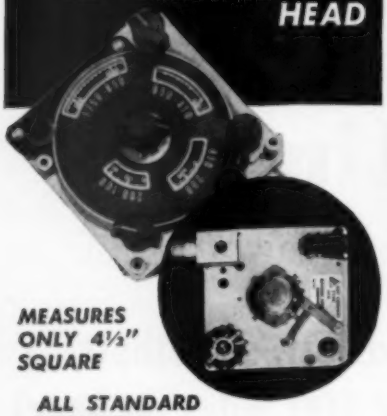
President, GENERAL MOTORS CORPORATION

The Allison Prop-Jet engine is backed by more than 7 million hours of turbine engine flight time—experience where it counts most—in the air.

ALLISON
PROP-JET POWER
ALLISON DIVISION OF GENERAL MOTORS
Indianapolis, Indiana

BUILT IN THE UNITED STATES FOR THE NEW ERA IN AIR TRAVEL

NEW!
ADF CONTROL
HEAD



MEASURES ONLY 4½" SQUARE

ALL STANDARD CONTROLS

- Band Switch
- Volume Control
- Left & Right
- Function Control
- Fits Edge-Lighted or Standard Panels

Order Now For Immediate Delivery

Your Best Source For Aviation Electronic Equipment

AVIATION AA ACCESSORIES

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Circle No. 35 on Reader Service Card.

WHAT IS "THE FIRST ORDER OF BUSINESS" every day?

Many must items in the day's business are set aside when the American Aviation DAILY arrives on the desk of a key executive in the industry. That's because the DAILY is first reading for aviation's leaders, ever since it began in 1939. The DAILY offers these leaders, and all others interested in aviation, up-to-the-moment information about every important event taking place AS IT HAPPENS.

For a sample copy, forward your request to Dept. B. American Aviation DAILY, (An American Aviation Publication) 1025 Vermont Avenue, N.W., Washington 5, D. C.

LUND SUPPLIES S-55 ENGINES, TOO!

The Sikorsky S-55 helicopter is one of several new production aircraft powered by Lund-supplied engines.

These P & W R-1340's were overhauled by the reputable Airwork Corporation—then re-inspected before delivery by Lund specialists to insure that all pre-installation modifications were complete.

Proof of Lund quality is this: *85% of all Lund engines are factory installed in new production aircraft.* See Lund about the engines you need and assure yourself of the quality that guarantees long term, low cost dependability.

Years of Personal Performance Are the Foundation of

Lund Aviation, inc.

Millville, New Jersey • Montreal, Canada • 230 PARK AVENUE, NEW YORK 17, N.Y., U.S.A.

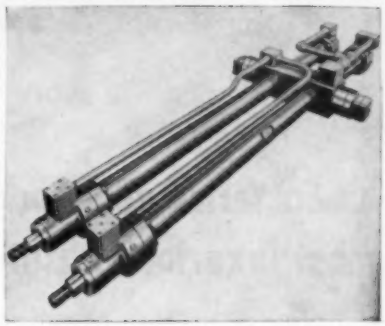
Circle No. 36 on Reader Service Card.

NEW PRODUCTS

BC433 equipment and is usable for either straight or 90-degree tach-shaft output. The instruments require depths of 1¾ to 2 23/32 in. behind the mounting panel, depending upon the unit used.

Circle No. 173 on Reader Service Card.

YOKED TRUNNION CYLINDERS



Twin cylinders, yoke trunnion-mounted for operating the model plane support carriage in a trisonic wind tunnel, have been designed by the **Oilgear Co.**

The cylinders have a 4½-in. bore and a 108-in. stroke. Pistons, integral parts of the rams, are chrome-plated. Guides for the pistons and rams are bronze. Garlock ram-wipers are in the front head. "O" rings and packings are designed for use with fire-resistant fluid.

The cylinders have adjustable hydraulic cushions. They decelerate 7,600 lbs. of mass at 5 fps in 2.4 in. Net weight of the unit is 2,400 lbs.

Circle No. 157 on Reader Service Card.

HYDRAULIC PUMP MOTOR

A hydraulic pump drive motor weighing only 28 lbs. is being produced by the **Aircraft Division of U.S. Electrical Motors Inc.**

Designed for intermittent duty, the motor delivers 11.5 hp at 2,450 rpm for 10 seconds and 1.5 hp for 170 seconds. It operates on 3-phase, 400-cycle alternating current, up to altitudes of 25,000 ft. and has a starting torque of 45 ft. lbs.

Specification sheets describing the Type GA hydraulic pump drive motor are available on request.

Circle No. 160 on Reader Service Card.

Scientific achievement in the field of aircraft and missile development is literally attaining new horizons ... Keeping pace with those milestones of progress, Giannini, too, is advancing—both in theory and in practice.

Reducing the art of high speed high altitude instrument design to a science, Giannini engineers and scientists apply knowledge acquired through years of extensive experience with commercial and military aircraft instrumentation. When flight becomes higher and faster, the intensive research policy and progressive design practice at Giannini will continue to provide solutions to the ever increasing problems of the aircraft industry.

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Engineering positions are open at several Giannini locations for career-minded young men—write for details.

G. M. GIANNINI & CO., INC., PASADENA, CALIFORNIA

Circle No. 37 on Reader Service Card.

Maintenance Bulletin Board

C-W Plastic Propeller Fairings Cut Weight and Cost in Half

Plastic trailing edge fairings developed by Curtiss-Wright have been installed on KLM Super Connies, one of which is shown here.

A plastic fairing for aircraft propeller blades, developed by Curtiss-Wright Corp.'s propeller division, weighs approximately half as much as equivalent sheet metal fairings and is said to cost just about half as much.

According to Curtiss-Wright, tests indicate a trailing edge plastic fairing, which fairs into the blade shank about 80% back of the leading edge, boosts the cruising speed of Lockheed Super Constellations by 5 mph and gives an increased rate of climb.

Close-up of Isofoam trailing edge fairing for propellers made by Curtiss-Wright's propeller division.

KLM Royal Dutch Airlines has installed the fairings on its entire fleet of Super Connies and has accumulated more than 1,700 hours flight time in approximately a year. The Air Force has ordered full plastic fairings for all C-124C Globemasters, on the basis of several hundred hours' flight time. Seaboard and Western Airline's fleet of Lockheed L-1049 Constellations also is being equipped with the fairings.

Basic material used is a polyurethane foam plastic (Isofoam) weighing about 20 lbs. per cu. ft. Procedure and equipment needed for installation are said to be so easy that the fairings can be installed in the field.

Curtiss-Wright's propeller division is replacing all conventional sheet metal fairings with plastic. Company engineers have found plastic fairings a valuable and economical research tool for early test evaluation of aerodynamic variations in blade shank design as well as actual fairing design.

Nickel Plate Coating Cuts Prop Repair Costs

An "armor coating" of nickel plate that protects aircraft propeller blades against damage from stones, debris and water spray has cut propeller maintenance costs.

According to Erle Martin, general manager of Hamilton Standard division, United Aircraft Corp., success of the new process has been borne out in more than 2.5 million hours of commercial and military operations.

Martin says the thin nickel coating, used on either solid aluminum or hollow steel blades, has virtually eliminated abrasion and erosion damage to props on Boeing 377 Stratocruisers, USAF Fairchild C-119s, Navy Martin P5M and Grumman UF-1 aircraft.

In recent airline testing, a Martin 4-0-4 aircraft was inadvertently taxied over a runway area covered with loose trap rock. The result—a propeller fitted with unprotected blades required extensive maintenance to repair damage, whereas the "armored" blades were virtually unscratched.

The process for applying nickel to aluminum blades is a joint development of H-S and Bart Laboratories Co., of Belleville, N. J., for the USAF and Navy. It calls for use of a synthetic rubber compound to bond the nickel plating to the aluminum alloy blade surface.

Nickel coating of hollow steel blades is based on a bond created by successive layers of zinc and copper.

Martin Speeds Up Routing Operation

Tool engineers at The Glenn L. Martin Co. have hit on a simple means of eliminating two separate hand operations on jobs calling for portable routing.

In the past, before using an air-powered portable router, lubricant was applied to the cutter with a paint brush. Chips were then blown away with an air hose during cutting intervals.

Now Martin has put the exhaust end of the air-driven router to work. By attaching an air tube to the exhaust port and an oil cup to the tube, both operations have been eliminated. Regulated oil is fed into the airstream, which blows on the cutters, lubricating the cutter and clearing the chips simultaneously.

Hughes-equipped T-29 "flying laboratory" for systems evaluation.

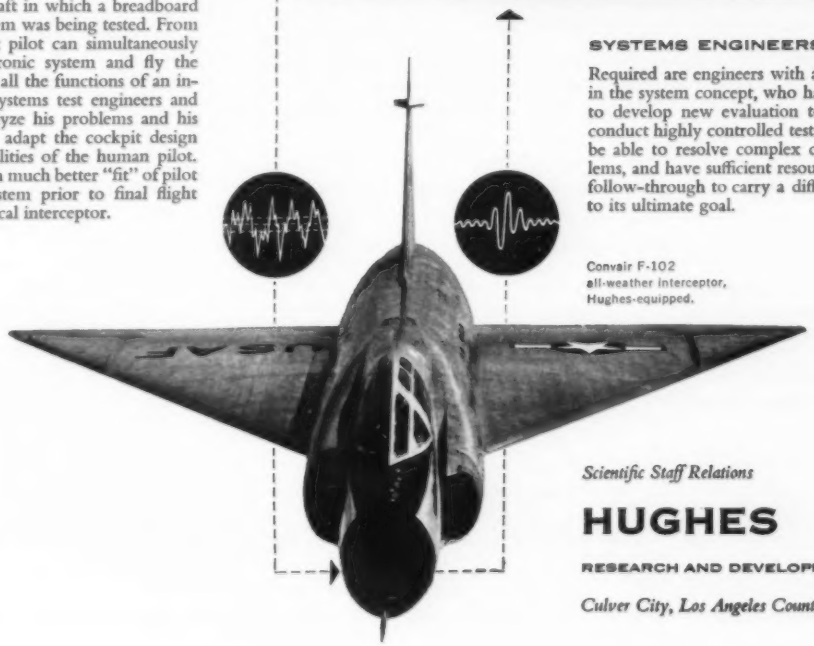
Flight evaluation of advanced interceptor electronic system uses unique approach.

T-29 "INTERCEPTOR"

THE DEVELOPMENT OF AIRBORNE ELECTRONIC SYSTEMS REQUIRES THOROUGH FLIGHT EVALUATION OF BREADBOARD AND PROTOTYPE EQUIPMENT PRIOR TO FINAL DESIGN. AT HUGHES, SYSTEMS FOR INTERCEPTORS ARE FIRST TESTED IN "FLYING LABORATORIES" IN WHICH THE EQUIPMENT IS READILY ACCESSIBLE TO SYSTEMS TEST ENGINEERS.

One interesting problem recently confronting Hughes engineers was that of evaluating the requirements imposed upon the pilot of a high-speed one-man interceptor. This arose in the development of a new integrated electronic system to control several phases of an all-weather interceptor's flight. Because of the great importance of providing the pilot with the optimum design and arrangement of displays and controls, it became necessary to determine accurately the pilot's work load during flight, and the human factors that affect his ability to carry out his task.

The solution was to install a complete mock-up of the actual interceptor cockpit in a large T-29 aircraft in which a breadboard model of the system was being tested. From this cockpit a test pilot can simultaneously operate the electronic system and fly the T-29, performing all the functions of an interceptor pilot. Systems test engineers and psychologists analyze his problems and his performance, and adapt the cockpit design to the natural abilities of the human pilot. The result will be a much better "fit" of pilot and electronic system prior to final flight testing in the tactical interceptor.



Convair F-102 all-weather interceptor, Hughes-equipped.

SYSTEMS ENGINEERS

Required are engineers with a basic interest in the system concept, who have the ability to develop new evaluation techniques and conduct highly controlled tests. They should be able to resolve complex circuitry problems, and have sufficient resourcefulness and follow-through to carry a difficult program to its ultimate goal.

Scientific Staff Relations

HUGHES

RESEARCH AND DEVELOPMENT LABORATORIES

Culver City, Los Angeles County, California

ENGINEERS

NEW 2-FOLD
RETIREMENT INCOME PLAN

for Aviation and Missile Engineers

It's natural that a long-time leader in aviation, like Republic—with many firsts to its credit—should be a leader, too, in providing for the welfare of its staff. Right in line with this forward-looking policy is the remarkable new Republic Retirement Income Plan. Here is how it works:

PART 1 *is a basic Retirement Income plan paid for* entirely *by Republic Aviation.*

PART 2 *is a cooperative effort. It is completely optional. But if an engineer wishes to increase his retirement fund, by making a small monthly payment, Republic will* MORE THAN MATCH *his contribution.*

Take the case of a hypothetical engineer who joins Republic on January 1st, 1956, averages $8,000 a year for 15 years; then retires aged 65. If he elected PART 2 of the plan, he will have a total *monthly retirement income of $225.80,* including his social security. For this he himself will contribute *only $8.50 a month* to the Republic Retirement Income Plan.

Of course, the MORE YOU EARN, the HIGHER your Retirement Income will be. And Republic pays a top salary scale in the industry.

...RETIREMENT PLAN JUST ONE OF MANY PLUS FACTORS POINTING TO A REPUBLIC CAREER

FIRST — there's the interest and prestige of working for a pioneer in aircraft design, creator of such famous planes as the F-84 Thunderjet, the F-84F Thunderstreak, RF-84F Thunderflash and XF-84H. (Soon to be followed on the production line by the new F-103, F-105 and RF-105.)

SECOND —the company is expanding sharply, providing frequent opportunities for able men to advance. In fact a $12,000,000 increase in the Research and Development Program has just been announced.

THIRD —an All-Expense Paid Relocation Plan for qualified engineers living outside the New York City and Long Island areas, which makes it easy to move to Republic. Other liberal benefits: Life, Accident and Health Insurance; Hospital-Surgical Benefits for the whole family; educational aid covering ⅗ the cost of collegiate and graduate study.

Serve your own best interests. Make full inquiries into the many advantages of joining Republic now, not the least of which is living on Long Island—the Playground of the East.

Important engineering positions are now open at all levels:

- STAFF ENGINEERING
- PRELIMINARY DESIGN
- ELECTRONICS
- WEAPONS SYSTEMS PROPOSALS
- OPERATIONS RESEARCH
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- TECHNICAL WRITING
- DYNAMICS
- ELECTRO-MECHANICAL DESIGN
- FLIGHT TEST
- RESEARCH
- THERMODYNAMICS
- FLUTTER & VIBRATIONS
- STRESS
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- DESIGNERS: Electrical, Airframe, Mechanical

Please address complete resume outlining details of your technical background to:

REPUBLIC AVIATION

AIRCRAFT
Assistant Chief Engineer, Administration **Mr. R. L. Bortner,**
Farmingdale, Long Island, N. Y.

MISSILES
Administrative Engineer, Mr. Robert R. Reissig
Hicksville, Long Island, N. Y.

People

MANUFACTURING

Harold G. Hynd named vice president and gen. mgr. of Douglas Aircraft Co.'s Tulsa division; **Jess L. Jones** promoted to works mgr. at Tulsa, succeeding Hynd; **J. L. Bromberg** named chief project engineer of a classified missile project.

Mark R. Miller joined Lockheed Aircraft Corp.'s California division at Burbank in commercial sales work.

Angelo Gualtieri named technical representative in the United States for D. Napier & Son Ltd.

Hynd

Miller

Donald B. Nason appointed vice president and director of government products engineering of the Crosley Division, Avco Mfg. Corp.; **W. R. Lawrence, Jr.**, appointed vice president and gen. mgr. of the Nashville, Tenn., operations; **Dr. Arthur R. Kantrowitz** elected vice president and director of the research laboratory.

Harold Wells named chief engineer of the aircraft hydraulics engineering group at the Bendix Products Division, Bendix Aviation Corp., South Bend.

William L. Mustard appointed field service mgr. for Link Aviation, Inc.

Stokley Webster will become gen. mgr. of Norden-Ketay Corp.'s new Gyromechanisms Division.

Henry J. Hamm named international sales mgr. of the LearCal Division of Lear, Inc.; **Paul O. Momenteller** succeeds Hamm as commercial sales mgr. of the division.

Dr. Theodor Buchhold, German rocket expert, becomes consulting engineer for the General Electric Co.; **John I. Lerom** joins the aircraft nuclear propulsion dept. at Evendale, Ohio.

Dr. Louis G. Dunn elected vice president of The Ramo-Wooldridge Corp.

Rudolph Hallberg named gen. mgr. of Lovequist Engineering Co., Los Angeles.

Frank J. Martin appointed asst. sales mgr. in charge of commercial aircraft, Allison Division of General Motors.

George R. Lawrence made director of marketing, **Gerald B. Wright** named mgr. of a special Hustler Systems department, **Thomas W. Melia** appointed mgr. of surface systems, and **Robert Lyons** mgr. of air systems, all in the sales division of Sperry Gyroscope Co.

James E. Sullivan, recently retired director of the Airborne Equipment Division, Navy Bureau of Aeronautics, elected a director of Irving Air Chute Co., Inc., Lexington, Ky.; **A. B. Chandler** resigned as a member of the board to become Governor of Kentucky.

John W. Myers, president and chairman of the board, named chief executive officer of the Pacific Airmotive Corp.

Howard K. Morgan appointed director of commercial aviation systems for Bendix Aviation Corp.

Gerald J. McAllister has resigned from *Aviation Week* to join the Washington staff of Hill and Knowlton, Inc., serving the Aircraft Industries Assn., succeeding **De Witt Ballew, Jr.**, who recently resigned.

Edmund T. Price named chairman of the board of Solar Aircraft Co.; **Herbert Kunzel** made president; **R. Sherman Platt** promoted to secretary.

Howard K. Morgan appointed director of commercial aviation systems for Bendix Aviation Corp.

Harold H. Warden resigned as gen. sales mgr. of the Propeller Division of Curtiss-Wright Corp.

Capt. T. H. Templeton (USN, ret.) named executive asst. to the president of Reed & Reese, Inc.

Dr. Sherrerd B. Welles appointed mgr. of missile systems laboratory of Sylvania Electric Products, Inc; **Dr. Edwin G. Schneider** named chief engineer of electronic systems division.

Prentiss Cleaves appointed aviation sales mgr. for Lemert Engineering Co., Inc.

Theodore C. Beug made advertising mgr. for the industrial and precision divisions and **Richard H. Ewert** named mgr.—gearing sales at Foote Bros. Gear and Machine Corp.

AIRLINE

Collings

John A. Collings, executive vice president since 1951, has been appointed interim president of Trans World Airlines to fill the vacancy left by the death of Ralph S. Damon. Collings has been with TWA and its predecessor companies since 1928.

Piedmont Aviation, Inc. elected **C. Gordon Brown** asst. vp-traffic and **William G. McGee** general sales manager.

Hector Cruz appointed U.S. sales mgr. for LACSA Airlines.

Warren N. Martin appointed director of public affairs of the Air Transport Assn.

Gilbert Giraud named general traffic and sales mgr. for the North, Central American and Caribbean Division of Air France.

Capt. Malin Sorsbie, gen. mgr. of East African Airways Corp., has retired because of ill health.

Harold J. Meinkoth named supervisor-revenue accounting for Ozark Air Lines.

Gen. C. J. Venter retired as head of South African Airways on January 31.

GOVERNMENT

Donald J. Strait succeeds **John I. Lerom** as Deputy for Reserve and AFROTC Affairs to Assistant AF Secretary David S. Smith.

Franklin Oelschlager, chief investigator of CAB's Office of Compliance, resigned to join the compliance office of the Air Traffic Conference.

William B. Davis appointed director of the Office of Aviation Safety, Civil Aeronautics Administration.

Look to GYROMECHANISMS, INC.

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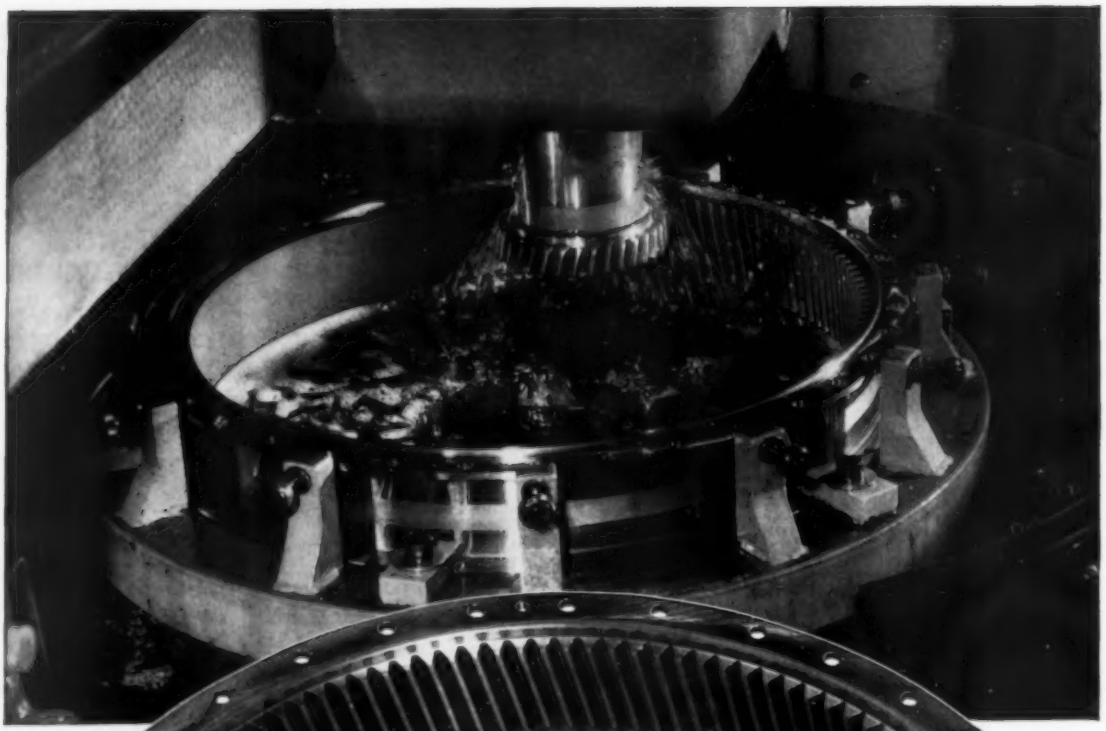
and then we built



This 7 pitch, 19.1564″ pitch diameter internal gear for the Sikorsky S-58 Main Transmission

This HARD (Rockwell "50C") gear is cut after heat treating to master gear standards:

.0002″ per inch maximum lead error
+.0000 −.0003 involute error
.0002″ tooth spacing tolerance
60 RMS finish

INDIANA GEAR

INDIANA GEAR WORKS, INC. • INDIANAPOLIS, INDIANA

Circle No. 40 on Reader Service Card.

West Coast Talk . . . By Fred S. Hunter

• Disposing of some very odd questions.
• Mighty fancy crew seats being made.

EVERY NOW AND THEN we get a rash of inquiries from readers. Some of them are beauts, too. For example: What are Pratt & Whitney's plans for a titanium J57? (In collaboration with Tiffany's, no doubt.) Was Convair's Atlas project stretched out from five to 10 or to 12 years? (Referred to Ramo-Wooldridge.) Have test firings of the SM-62 Snark with the new Mark I system been successful? (We thought Mark I was an old Jaguar.) Is there any foundation for the rumor the Lockheed F-104A is so fast it actually stalls out at anything less than Mach 1 at 50,000 feet? (That must have been Tony LeVier's Volkswagen you heard about.) Was it Capt. Eddie Rickenbacker who said: "You can't tip-toe out of an airport?" (Either the captain or Arthur Godfrey.)

Hunter

• •

Douglas Aircraft Co. records show 6,500,000 hours of flight experience have now been accumulated by DC-6/7 type aircraft. But these modern transports have a way to go to equal the 150,000,000 hours or more of DC-3 time. Douglas built something more than 11,000 DC-3s —including military versions—and 7,700 are still flying. Even in this DC-7 age, this 20-year-old design accounts for 17,000,000 passenger miles a day in scheduled service.

• •

Crew seats developed by Burns Aero Seat for the Lockheed Electra slide forward, backward and sideways, and they also elevate and recline. Operation is manual. But Burns, thoughtfully, is now working on a device to allow for electrification to give pilots push-button control, just like on their Cadillacs. And speaking of Cadillacs, Pan American is getting mighty stylish these days. Advance style buckles it has ordered from the Brown-Line Corp. for its new Douglas DC-7Cs are the same as those Brown-Line supplies to Cadillac.

• •

It will be interesting to see whether the Air Force leans toward two engines or toward four engines in the long-range interceptor competition. Two of the three companies in the Phase I contest are said to favor four engines. Perhaps the Air Force will take an extended look by awarding Phase 2 prototype contracts for one of each configuration.

• •

Menasco Manufacturing's new $1,250,000 Texas plant, scheduled to open May 15, will be a second source on two items it is presently producing at its Burbank facility—landing gear for Convair's F-102A and Nike bottles for Douglas-Charlotte . . . Hampden Wentworth, president of Longren Aircraft, may build a bush-type plane in Mexico, where he recently formed Longren de Mexico, S.A. . . . Talk about engineering effort, the Douglas DC-8 is the outcome of 720 different configurations.

• •

If the Air Force personnel problem is so critical it lacks ground crews to keep its F-100s flying, what happens when it comes time to make the new F-101s, F-102s and F-104s operational? . . . Hughes Aircraft has passed the 5,000 mark in employment at its Tucson missile plant . . . Architects drawing up plans for Los Angeles International Airport improvements submitted a proposal for a $9,000,000 underground auto park, which you can be sure will be the first item to get the economy axe.

• •

Bob Prescott was first in line to check out on it when the Flying Tiger Line acquired a Cessna 310 for an executive plane . . . Lt. Col. J. L. Ridley, whose first assignment at Edwards Air Force Base was as a project engineer on the Bell X-1, moves up to full colonel on April 20. He's been chief of the flight-testing engineering laboratory since 1947 . . . Dick Maystead, formerly v.p. and chief engineer of Talley Machine & Manufacturing Corp., has branched out on his own as an engineering and management consultant to the aircraft accessory and equipment industry in Sepulveda, Calif. . . .

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27 YEARS OF FRIENDLY TRANSPORTATION

International Aviation

By Anthony Vandyk

No one can say that the French aircraft industry doesn't try hard to export its products. Latest project by France in its effort to become a world-wide supplier of aircraft is a demonstration tour of a type never before attempted in aviation history. A group of models manufactured by various companies will leave France in a couple of months on a program that will include demonstrations in the Middle East, Asia, and Australia.

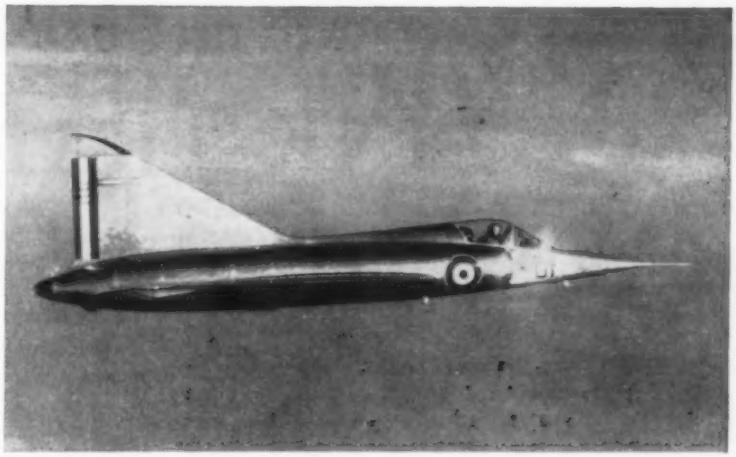
In the touring group will be two big transports which will serve as "mother aircraft" as well as demonstrators. These two planes, a Hurel-Dubois HD 32 and a Nord 2501 Noratlas, will fly the two helicopters in the group between points where the demonstrations are to be staged. The Sncase Alouette and the Sncaso Djinn will be the two rotorcraft participating in the tour. Another member of the French group will be the SIPA Coccinelle, low-price personal aircraft. Participation of the big Breguet Deux Ponts transport and the Morane Saulnier 733 trainer is also possible.

• **While final preparations** are being made for this ambitious demonstration tour, arrangements are being made to demonstrate another French aircraft in a different part of the world. Sncase plans to bring its twin-jet Caravelle to the Western Hemisphere either late this year or early in 1957. The transport will fly to the U.S. and Canada via Dakar, Brazil and northern Latin America, according to present plans. Promotion-minded Sncase president Georges Hereil has already launched a big publicity campaign for the Caravelle in Europe and the U.S.

• **Demonstration tours** by French aircraft are nothing new. Several years ago the U.S. was given its first look at a low-powered jet when a Fouga was demonstrated in the U.S. Last year Morane Saulnier, helped by Beech, staged a highly successful, lengthy tour of the U.S. and Canada by the MS 760 Paris light jet.

So far, it must be admitted, the French have had little success in the export market despite many demonstrations of several interesting and often unique aircraft. One reason for this is that in the past, the French themselves have often not shown confidence in the products they have demonstrated by ordering them in quantity for their own use. Nonetheless, the recent order for 12 Caravelles by Air France shows that things are changing. The French aircraft industry can no longer complain that it is not getting the support it needs to break into foreign markets.

France's Mach 1.7 Fighter



JET-PLUS-ROCKET power should make Dassault 550 delta a Mach 1.7 fighter. Aircraft is currently being readied for flight with rockets as well as jets. Hitherto it has flown using only its Viper jets.

Aircraft Industry Ranks 9th in Canada

The Canadian aircraft industry now ranks ninth among Canada's manufacturing industries in terms of sales and third in industrial employment, J. Geoffrey Notman, president and general manager of Canadian Ltd. told the Royal Commission on Canada's Economic Prospects last month.

In a statement on the nation's aircraft industry, Notman revealed that sales in 1955 are estimated at $300 million as against $345 million in 1954. The industry's record year was 1944 when it employed 79,600 people and had a sales volume of $427 million.

The lack of a steady, long-range program for the industry has resulted in sharp fluctuations in sales and employment, Notman observed. He pointed out that in 1946 sales fell to $36 million while in 1948 employment hit its post-war low of 8,000. With such changes, he said, it becomes difficult to attract and retain skilled and scientific personnel.

Notman told the Royal Commission that the aircraft industry is drawing to an increasing degree on Canadian supplies for materials, services and equipment. Canadair, for instance, buys 21% of its material from the U.S. at present as against 35% in 1951. In the past six years, Canadair has spent $80 million in the U.S. and has sold $69 million of aircraft and parts to the U.S., Notman revealed.

Manufacturing Briefs

Vickers-Supermarine N 113 naval fighter powered by two Avons made its first flight last month. It has droop snoots, flap blowing and saw-tooth wing . . . Fifth production **Bristol** Britannia flew on January 17 . . . **Blackburn & General Aircraft** has so far built about ten of its big Beverley freighters for the RAF to date. New service requirements, necessitating modifications, are delaying deliveries and preventing formation of the first squadron . . . **Aviation Traders** has decided that the production version of the Accountant DC-3 replacement will have a lengthened fuselage giving 42-seat capacity . . . German production under license of the **Snca du Nord** 2501 Noratlas by the **Flugzeugbau Nord** group will involve 100 aircraft. Another 20 will be supplied by the French company.

France's two major aircraft engine companies, Hispano-Suiza and Turbomeca, are setting up a joint company to work on medium-power turbojets and turboprops. The new firm will have no production facilities and will subcontract prototype and production orders to the two parent companies . . .

Transport Briefs

British European Airways plans to withdraw its Elizabethan (Airspeed Ambassador) piston-engine transports in 1960. The plan to re-engine them with the Napier Eland turboprop has been abandoned . . . **BOAC** will sell some of its L-749A Constellations as soon as the Britannia is in service but will retain all of its Canadair Argonauts. Britannias will go on the South African route in the summer and on the run to Australia in the fall. **SABENA** has bought a fourth Boeing 707-320 for delivery in June 1960 . . .

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- *Northrop F-89D twin jet all-weather interceptor*
- *McDonnell F2H-3 twin jet fighter*
- *Cessna T-37A jet trainer*

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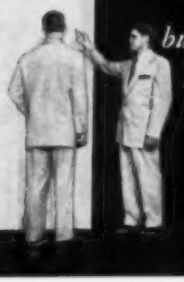

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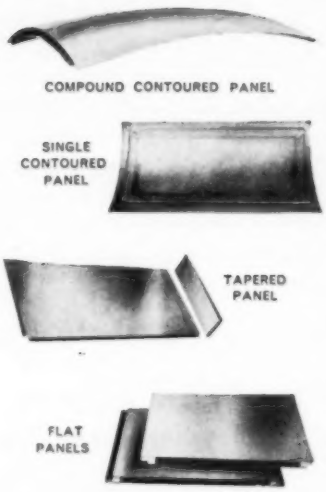

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Spares for Out-of-Production Planes Costly, But Shortage Isn't Critical

By LOIS C. PHILMUS

Fears among business flying groups that a critical shortage is imminent in spare parts for out-of-production transports still in service are exaggerated.

While the surplus parts market is fast being depleted, prime manufacturers are either producing new parts or contracting with smaller firms to do so.

Costs have zoomed. On some items they are reported to be 10 times that of seven or eight years ago. But this is at least partially to be expected, in view of the times.

"The question of current cost for spare parts is . . . different from the cost structure when many of these airplanes were converted for business use," says Henry W. Boggess, president of the National Business Aircraft Association.

• **Explained Boggess:** "Surplus parts are about exhausted. The parts now being purchased have not been subsidized by the armed forces and all owners must expect to pay the costs of manufacture and distribution on today's labor and material prices."

He added that businessmen "cannot expect to buy newly manufactured parts with today's high-paid labor and high material costs at a price comparable to surplus items sold by the government at 10 cents on the dollar."

What reliance on new parts calls for is a change in thinking on the part of the fleet operator. Foresight, through more detailed planning which would lead to placing orders far enough ahead to meet continuing requirements is needed badly.

W. J. Connell, aircraft shop superintendent for Southwest Airmotive of Dallas, pointed out that manufacturers try to accumulate small orders for spare parts for such planes as the DC-3 or Lodestar. This often leads to delivery dates of 120 days after placement of the order. The maintenance base, therefore, must anticipate needs considerably before planes are brought in. It is much more difficult to accomplish such scheduling for business planes than for airlines.

Orders Must be Accumulated

The accumulation of spare orders is necessary if costs are not to soar even higher, Connell said. Cost would be far too great on a "custom" basis. This applies whether a large manufacturer is producing the parts or whether production is contracted to a smaller firm.

The spare situation on specific surplus airplanes was spelled out by Connell. He found "no problem" on parts for B-25s and A-26s because the military are still using them, as are foreign governments. So parts are continuously available. "No problem" exists on the Beech C-45, since D-18s parts can be used as is or can be easily adapted to the older military model.

• **A "squeeze" does exist** on parts for the C-47, PV-I and Lodestar, although it is not as serious as pictured in some quarters. Where new parts are not available, Southwest Airmotive has found the prime manufacturers extremely cooperative. They have scouts in the field looking for new outlets of supply and keeping the bases informed continuously. In some cases, scarce items have been imported from Australia and New Zealand.

The overhaul specialists have found that many of the parts for the new transports are interchangeable with the older types. Examples cited: Convair 240 wheels and brakes can be adapted to Lodestars and PV-1s with some modification. DC-6 wheels and brakes can be adapted to the DC-3, and have been found to be better in some cases. Supplies of exhaust systems have been depleted but new sources are continually being created.

SAC and other bases also have been building parts in their own shops by copying originals. SAC machinists have been tooling landing-gear bushings, bolts and bulkheads. It has been found that costs can be kept down by the copying process, but facilities are too limited to engage in this to any great extent.

The ever-present cost "problem" cannot be solved by creating new manufacturing sources, it is pointed out. The cost would be higher or similar to purchase off-the-shelf from the original manufacturer.

• **The consensus** appears to be that parts may be harder to get, cost more than when the planes were converted for executive use, and call for more realistic planning. But speculation that manufacturers will cease supplying new parts as the planes go out of airline and military service appears erroneous.

Boggess said flatly that "there is not now or in the foreseeable future a probability that parts will not be available. So long as these aircraft are continued in operation (whether by airlines or American industry) the prime manufacturers will enjoy a profitable business in supplying requisite spare parts. Certainly at this time and for a few years to come, these airplanes will be in operation and until they are reduced to salvageable items I cannot believe that manufacturers will cut off the flow of essential parts." ◈◈◈

Folding Door and Steps

A combined step-door for the Twin Beech has been developed by The Ohio Aviation Co., Vandalia, Ohio. CAA approved, the door was designed to eliminate the swing-back door and auxiliary ladder. It folds up and is shut by a heavy duty lock with separate safety catch.

Illinois Sponsors Courses in Safety

Illinois Department of Aeronautics has launched a series of ground school safety refresher courses throughout the state for Illinois pilots and airport operators. The free courses, part of the state's "safety through education" aviation program, include 39 hours of classroom work in navigation, meteorology, aircraft and engines, and Civil Air Regulations.

First course was held in Springfield. The department is currently trying to interest extension divisions of Illinois colleges and universities in running the program.

Wilmington, Del. Gets New Business Hangar

Atlantic Aviation Service of Wilmington, Del. is dedicating its new $600,000 business flying hangar at New Castle County Airport this week. The new structure will more than double its facilities for private and business aircraft. The 50,000-sq.-ft. hangar includes a storage area with a two-story addition on each side for shops and administrative, sales and flight offices.

Customer facilities include reception room and lounges for executives and pilots. An automobile parking area has been provided near the building. Concrete ramps at each end of the hangar provide outside storage and parking for transient aircraft.

Lear Gets New Orders For Executive Planes

Orders for five Learstar executive transports have been received by the Lear Aircraft Engineering Division of Santa Monica in the last 60 days, according to J. Nelson Kelly, manager. Contracts, totaling $1.9 million, include two from European companies.

In addition, 13 Learstars, valued at close to $4 million, have been shipped since the Lodestar conversion first was produced in March, 1955.

Kelly said that to date Learstars have logged more than a million miles of operation and are increasing that figure at the rate of 200,000 per month. This high utilization, he noted, has resulted in a growing volume of periodic inspection and servicing activity at the Santa Monica headquarters.

Business Flying Briefs

• **Connecticut** became the first state to own a helicopter when it took delivery from Sikorsky on an S-51 recently. It will be operated under the direction of the Connecticut Department of Aeronautics for police, civil defense, disaster relief, traffic, conservation, survey and similar work. It has been fitted with special radio and rescue equipment.

* * *

• **Pittsburgh Consolidation Coal Co.** recently purchased two Beechcraft Super 18s at a cost of more than $250,000. One has been assigned to the sales department and the other for general use between district offices in 13 cities. Major reason for the company planes has been the poorly developed schedules between Pittsburgh and the cities involved.

* * *

• **Emmet E. Baker, Jr.** has resigned as supervisor of executive and business aircraft radar and radio sales for Bendix Aviation to become manager of the electronics division of Chamberlain Aviation of Akron. He will be in charge of systems engineering of radio and radar installations in business aircraft. Chamberlain, in addition to conversion and modification of aircraft, is engaged in the manufacture of radomes.

* * *

• **Plymouth Oil Co.** of Sinton, Tex. has placed the first order for a Mark II Learstar conversion, recently announced by the Lear Aircraft Engineering Division of Santa Monica.

* * *

• **Oscar L. Hostetter** has announced the moving of his airport facilities from York, Pa., to Thomasville, Pa. The York airport site has been closed to aviation activities. A macadam runway extension at the new airport is scheduled to be completed by July 1, providing 4,200 feet.

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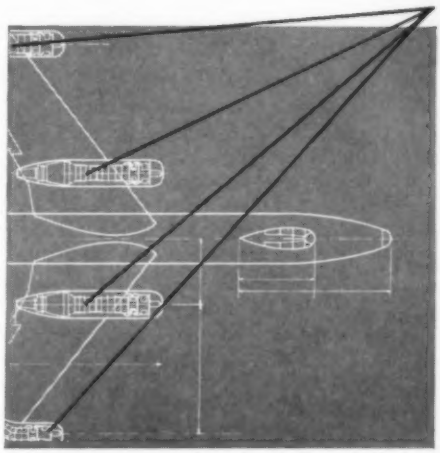

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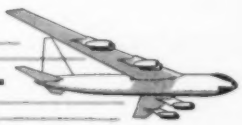

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McKinnon-Hickman Produces New Conversion of Super Widgeon

McKinnon-Hickman of Portland, Ore. is producing a Super Widgeon conversion. The conversion has been designed for a group of the twin-engine amphibians built in France under license from Grumman Aircraft Engineering Co. Known as the SCAN 30, the planes were purchased new in France by Welsch Aviation Co. of New York.

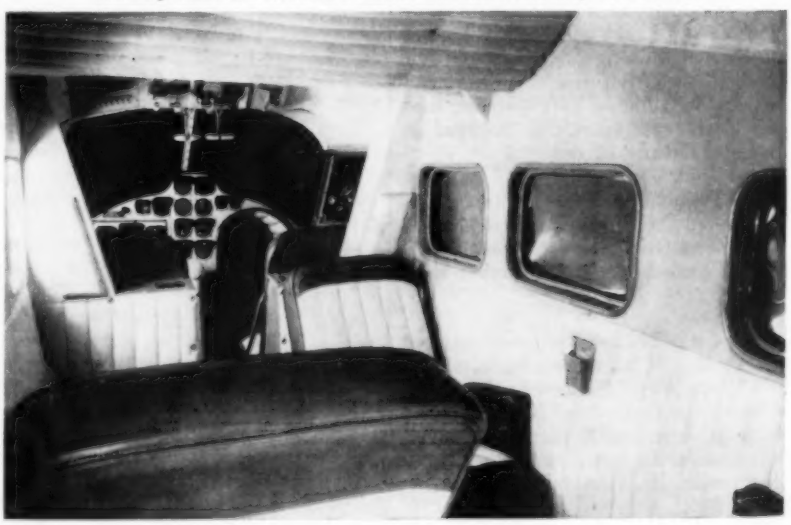
Conversion design calls for landing gear and hull modification to allow a 5,500 lb. gross weight, land and water, up from the 4,700 lbs. original gross on the Grumman G-44A. Installation of extra fuel tanks in the outboard panels increases capacity from 108 gallons to 154 gallons. Wings and flaps are covered with metal. Elevators, rudder and ailerons are recovered with fabric.

Either 270-hp. or 295-hp. Lycoming engines with Hartzell three-bladed propellers are installed. Electrical system is 24-volt, with all switches and circuit-breakers mounted overhead on the pilot's side.

The company also has arranged a new instrument panel with a special grouping of flight instruments directly in front of the pilot.

Interiors include pilot and co-pilot seating, with three reclining chairs mounted in the cabin. An extra seat is available when an escape hatch is installed. Price of the Super Widgeon is $70,000 FAF Portland, excluding radio. The Portland firm has delivered 49 Super Widgeon conversions in the U.S., Alaska and Canada which were installed on American-built Grumman G-44's and G-44A's.

Performance specifications on the new plane include: Cruise speed, 170 mph at 75% power; maximum speed, 185 mph. Rate of climb is 1,750 fpm; service ceiling, 18,000 ft.; landing speed, 62 mph; single engine ceiling, 5,000 ft.; range, 1,000 miles; takeoff run (land) 600 ft.; takeoff from smooth water, 10 sec. ◈◈◈



Twin-engined Grumman Super Widgeon amphibian, built in France, is one of group being converted by McKinnon-Hickman to allow greater gross weight (5,500 lbs.). Interior of plane (below) shows new grouping of instruments on panel directly in front of pilot's seat. Three reclining chairs are mounted in cabin. One more seat may be installed.

TO THE FINE ENGINEERING MIND
SEEKING THE CHALLENGING PROJECTS IN

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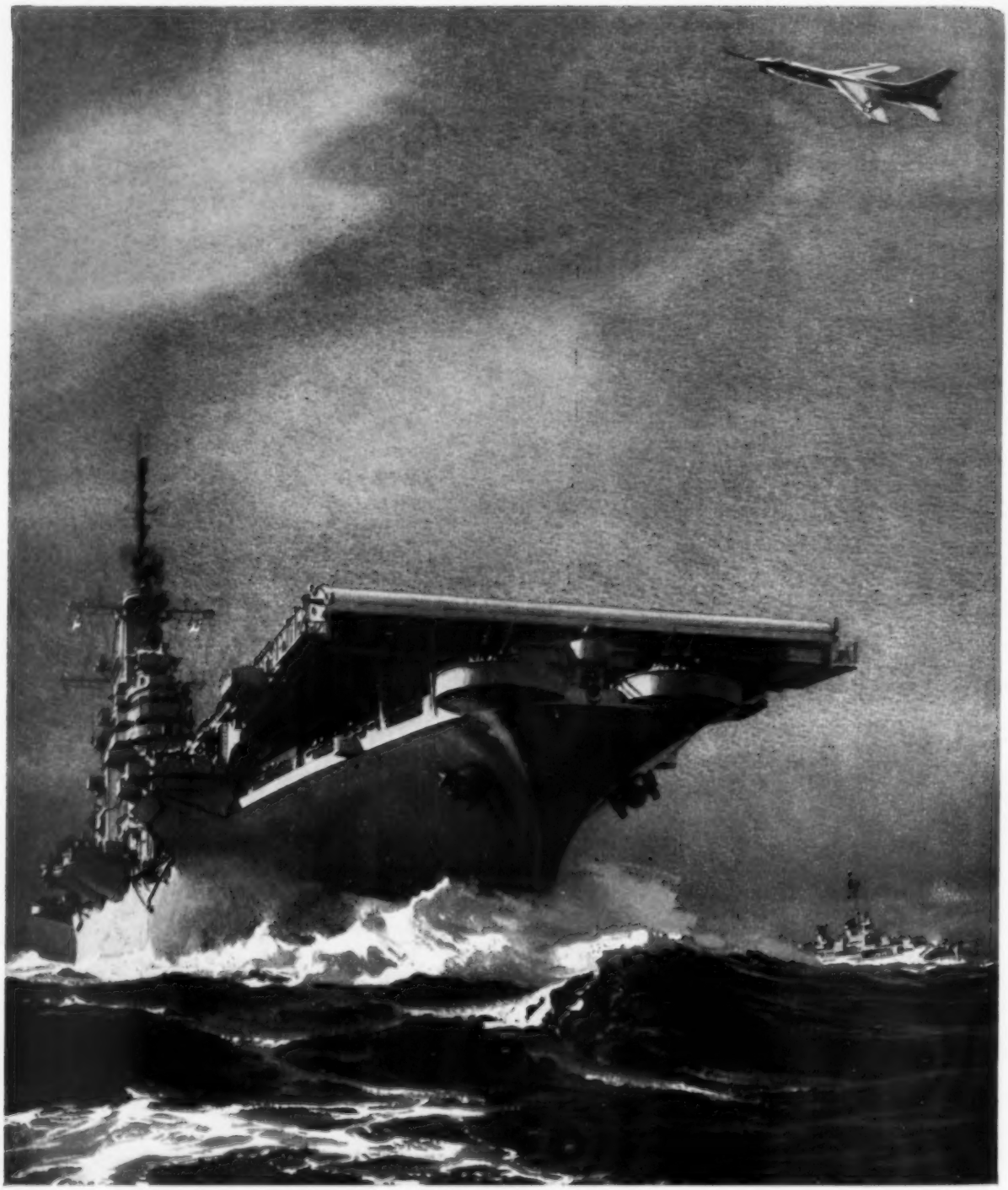

CHANCE VOUGHT'S F8U-1 *Crusader*, newest supersonic Navy fighter, depends on Hamilton Standard air conditioning systems, fuel controls, and other vital equipment. Currently in use on 40 different turbine-powered military aircraft, Hamilton Standard products play an important role in achieving more efficient aircraft and power plant performance. For superlative engineering, years of production experience, outstanding facilities for research and development, aviation in the jet age continues to rely on Hamilton Standard.

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TRANSPORT TRENDS

Washington, D. C., Feb. 13, 1956

LOOK FOR CAB TO RULE that Pan American and TWA realized "excess earnings" of $22 million in past transatlantic operations. This total will be used as offset against subsidy paid or owing for such operations.

AT LEAST ONE domestic airline president has been approached to see if he's interested in heading TWA. He submitted terms and conditions, believed to be stiff, and hasn't heard further.

TOP CHOICE for CAB chairman, succeeding Ross Rizley, is Val Peterson, Civil Defense Administrator. All that remains is final clearance by Republican National Committee. His name emerged in top spot out of about 12 candidates. Rizley's federal judgeship is expected at any time.

WILL CAB FORCE A FARE CUT? There's industry fear that it may try. Board has shown considerable interest in fare construction practices. CAB staff members feel airlines aren't taking advantage of shortest mileage in computing fares. Meeting with carriers on the subject was held last week.

Danger is this: almost any change demanded by CAB in constructing fares could lead to a general re-work of nationwide tariff structure.

Even more important: some CAB officials still maintain there should be an industrywide fare investigation. They may seize on current situation to start one.

ANOTHER AIRSPACE FIGHT is shaping up. Pentagon demand for more "shooting airspace" for missile tests is widening civil-military breach on Air Coordinating Committee's airspace panel.

Test case is now moving to top ACC for solution. Air Force wants to close Gulf Coast from New Orleans to Florida. Trans-Gulf flights of National and Braniff would be forced inland. Flight mileage would jump 20% on 20 daily flights.

Fear is that decision favorable to AF would set policy affecting many other routes. Airlines contend military should concentrate missile tests, not spread them all over U. S. coastline.

AIRLINES FACE BUSY TIME IN CONGRESS. Numerous items—some big, some little—demand attention. Election year may mean no action on many. But most still require research, testimony. Important so far have been hearings on bills overhauling Civil Aeronautics Act, Monroney probe of Fred Lee "firing" from CAA. Other developments bear watching.

There's more Congressional interest in air traffic control. Rep. John McCormack (D., Mass.) Democratic floor leader, urged committees to get busy on the subject. He raised a touchy point: the "possibility" that airlines might pay most of the cost of airways system. This means user charges.

Jet noise is getting serious attention. Bill by Rep. A. H. Bosch (R., N. Y.) would ban jets at busy airports, raise landing minimums for all planes.

Airline competition may be studied. Senate Small Business Committee is getting data from CAB on competition, may call officials for testimony.

Reduced fares for ministers (by unsubsidized airlines only) are proposed. And bills banning serving of liquor aloft are in the hopper.

CAB POLICY ON FEEDER SUBSIDIES CHANGING

Locals to Get Aid in Buying New Fleets

Increased mail pay and a more realistic approach to route structures would help offset cost of re-equipment programs.

By WILLIAM V. HENZEY

THE CIVIL AERONAUTICS Board can be expected to provide Federal aid for the local service airline industry's re-equipment program, at least insofar as it may involve newly-manufactured types of aircraft.

Also, because of some strong Congressional insistence, plus the initiative of some of its own key people, the Board has begun to lay the groundwork for a more realistic route structure for the local industry.

Apparently reconciled to the point of view that the locals' subsidy bill must go up before it can come down permanently, the agency hopes to offset added equipment subsidy needs as much as possible through an almost simultaneous route-strengthening program.

• **This thinking** was reflected in numerous interviews with top CAB officials. Each case, of course, as to individual carrier's equipment subsidy needs and route adjustments, is subject to a vote of the five-man Board. But as a matter of policy, the agency appears ready to remove some of the more serious economic shackles which have bound the local industry in the past.

On the equipment situation, what the new line of thought portends is that a local carrier can take on newly-manufactured planes and expect that initial higher costs, within the bounds of reasonableness, will be underwritten with subsidy mail pay.

No Specific Commitments

Planes such as the Fokker F-27 turboprop were discussed in this regard with the Board officials but, for obvious reasons, no commitments could be made as to specific types at this early date.

• **Equipment moves** by local carriers have been virtually on the minus side since the experience of Pioneer Airlines four years ago. Pioneer, which since has been merged into Continental Air Lines, converted its entire fleet from Douglas DC-3s to Martin 2-0-2s.

When the carrier applied to CAB for a higher subsidy to meet increased costs of the 2-0-2 operation, CAB refused, ruling that it would continue to pay subsidy on the basis of a hypothetical DC-3 operation.

In other words, the agency, then and since, has declined to pay any more subsidy than would be necessary to pay for a DC-3 service, though a higher cost airplane were actually being used.

Pioneer was forced by that action to revert to DC-3s, never fully recovered, and eventually sold out to Continental.

• **It should be noted** that Pioneer contended, at that time, that although its initial subsidy needs would be greater with the higher-cost Martins, self-sufficiency would eventually result from use of the more modern aircraft. Generally, that was not considered by CAB to be a sound management move.

But the thinking behind it is now taking hold. With such top Congressional figures as Sen. A. S. Monroney (D-Okla.) and Rep. Carl Hinshaw (R-Calif.) providing the spur, CAB thinking now appears to be turning on the two-fold premise that the equipment problem must be solved and route structures adjusted.

Two local lines have made semi-positive steps to acquire the new Fokker F-27. West Coast Airlines, as previously reported, has an option on six such planes and Bonanza Air Lines, at this writing, was contemplating an order for four.

Southwest Airways, Allegheny Airlines and Mohawk Airlines, of course, have been operating mixed-fleets of DC-3s and either Martins or Convairs. But in such cases, CAB has stuck generally to its Pioneer decision and fixed subsidy mail rates as though the lines were operating complete DC-3 fleets.

• **There are no indications** that CAB intends to change its thinking in connection with used airplanes for the local industry. But upon a proper showing of economic justification for purchase of some of the newer types, despite higher subsidy needs initially, CAB's mind will be more open than it was four years ago in the Pioneer decision.

Monroney and Hinshaw, perhaps the top two aviation powers in Congress, got into the act last December in the hassle over whether United Air Lines should be reinstated at three California cities served for the past few years exclusively by Southwest Airways.

CAB originally ordered UAL reinstated. Southwest and others petitioned for reconsideration and the CAB order was changed to put United back in at Santa Barbara and Monterey but not at Eureka as the original decision contemplated.

The two legislators did not feel CAB was complying with the wishes of Congress as expressed during last year's legislative fight, which resulted in permanent certificates for all local lines.

• **Hinshaw** expressed his position this way in a letter to CAB Chairman Ross Rizley: "I am completely clear on the fact that Board's action from a policy standpoint is contrary, not only to the desire of Congress, but also the expressed intentions of the Board itself regarding the future development of local service carriers."

Hinshaw promised an early investigation of CAB's attitude toward the local industry.

Monroney Writes Rizley

Monroney, who promised a similar investigation in the Senate, also wrote Rizley and said: "The Congress made it perfectly clear that the local service carriers were to be strengthened rather than suffer increased dependence on mail pay.

"If the policy implicit in the (Southwest-United) decision is allowed to stand, the feeder airlines will be effectively stopped from working themselves out of subsidies through their own initiative and energy by building up profitable local and feeder traffic loads where no traffic loads existed before."

• **That decision** of CAB's is now in effect and United has resumed operations at Santa Barbara and Monterey, but Southwest has renewed its petition for reversal by CAB.

However, the support for the locals'

welfare stirred by that case has given impetus to a route adjustment program.

CAB officials point to the recently-activated Seven States Area Investigation involving the area around the Dakotas as the first major proceeding aimed at definite strengthening of local carriers' routes.

Other such cases can be expected to develop in the future. The aim of all this, of course, is to make the local industry subsidy-free. CAB does not feel it can be accomplished overnight. Best estimates of top Board officials is that it will take about ten years to achieve the ultimate goal. ◆◆◆

Napier Eland Turboprop Conversion Of Convair Undergoing Flight Tests

LONDON—The long-awaited Napier conversion of its Convair 340 was rolled out late in January. Design and installational re-work was done by the company's Flight Development Establishment at Luton Airport.

The present conversion aimed at installing the turboprops with the minimum of airframe modification work. Although the small diameter of the Eland (36 in.) would have permitted considerable nacelle reduction, the standard firewall was retained to avoid an expensive major structural re-work.

The installed turboprops are more than a ton lighter than the standard R2800 piston engines, but because of their greater length there is no c.g. problem, since they project far enough ahead of the wing to compensate for the reduction in weight.

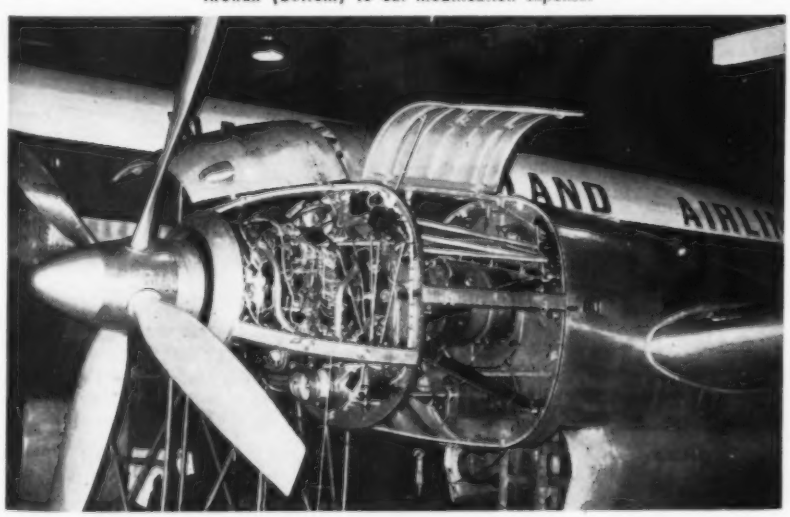
• **Current flight tests** are being made with Eland NE1.1, giving 3,200 ehp for takeoff. In the summer these will be replaced by a new engine, the NE1.6 of 3,500 ehp. This engine is a developed Eland 1, but should not be confused with the 4,000 ehp "hot turbine" NE1.4 and NE1.5 versions.

The extra takeoff power over that of the standard 340—1,600 hp with the NE1.1 and 2,200 hp with the NE1.6—allows the airplane to be loaded to its design gross of 53,200 lbs., compared with the present 47,000 lbs. The capacity payload of 12,880 lbs. can be uplifted for stage lengths of 1,220 miles.

As installed, the engines are fitted with 13 ft. 6 in. diameter, four-bladed, feathering and reversing de Havilland Hydromatic propellers. Napier Spraymat electrical de-icing is fitted to the spinners and the air intakes.

• **After flight testing,** the Eland-Convair will be given a limited C. of A. by the Air Registration Board. The program will then be to do route-proving on the sectors of European Convair operators. These flights will serve the dual purpose of demonstrating the airplane and of increasing engine flight hours. Napier will seek CAA recognition of the ARB certification, after which it intends to bring the plane to the U.S. to demonstrate to Convair operators.

Napier is backing its faith in the Eland-Convair conversion with an initial production batch of sixty engines.



Napier's Eland-powered Convair 340 is shown (top) just before first flight. Plate on fuselage side is temporary armor in propeller zone. Turboprop engines were fitted into regular R2800 firewall (bottom) to cut modification expense.

Convair Studying New Transport Design

Exploratory talks have started between General Dynamics Corp.'s Convair Division and several airlines on a new airplane designed to keep the San Diego manufacturer in the commercial transport field after orders for the 440 Metropolitan are filled.

Present design, featuring a low wing and carrying 60 passengers, is a short/medium range transport in the 70,000-lb. gross weight category. Convair is reportedly offering the new airplane either with two jet engines or with two Allison T56 turboprops and two Fairchild auxiliary jets to get airline reactions. The Fairchild engine is not the J44 but a new model, presumably the 2000-lb. unit now being developed for the USAF.

New plane is aimed at filling needs of operators who want something smaller but as fast or faster than the Lockheed turboprop Electra.

Convair's proposal bears no relationship to the "three-nation" turboprop transport but may go into production even if the decision is made to go ahead with the other airplane. A final ruling as to whether Bristol, Canadair and Convair will start production of the larger airplane is expected soon.

Alaskan Airlines Active

Two Alaskan airlines purchased new equipment recently. Cordova Airlines bought an Aero Commander from Vest Aircraft Co., Denver, and will use it on schedules between Anchorage and Seward. Alaska Coastal Airlines ordered a Hiller H-12C helicopter for charter work—the first helicopter purchase by a certificated Alaskan airline.

NO MORE LOST LUGGAGE MYSTERIES?

Two-Way Radio Helps Untangle AA's Baggage Mixups

By ERIC BRAMLEY

A principal source of passenger complaints—mishandled interline baggage—has almost been eliminated at Chicago by American Airlines.

The solution: use of a two-way radio hook-up between AA baggage trucks and the dispatcher's desk in the bag room, which made possible new expediting procedures.

Two years ago, it was a daily occurrence at Chicago's Midway Airport—biggest U.S. connecting point—to have as many as 12 pieces of interline luggage go astray en route to AA flights, according to James L. Hemingway, AA's supervisor of aircraft ramp services in Chicago. Today, he added, an even heavier volume of baggage is being handled "without mishap" and handling is "well over 95% efficient."

Receiving orders from dispatcher, truck driver can give priority to most urgently needed bag.

Problem Analyzed

In searching for a solution, AA analyzed its baggage problem as follows:

• **There are 4,000 pieces** of "exclusive" AA baggage daily at Chicago —bags belonging to through passengers which must be transferred from one AA flight to another, plus bags for boarding and terminating passengers. These cause little problem because AA has full control over them at all times.

• **About 1,000 bags** arrive daily on AA which must be delivered to outgoing flights of other carriers. Each airline is responsible for delivering interline bags from its incoming flights to the other companies. No truck communications problem exists here, and radio dispatch would not materially improve the situation.

• **The big problem** was with bags which must be transferred from incoming flights of other lines to outgoing AA flights—about 1,000 daily. AA found that the difficulty came in the handling of only 300 out of the 1,000.

American's bag room dispatcher at Chicago uses Motorola radio unit to direct trucks to proper ramp positions for baggage pick-ups.

"This meant that the mishandling of a mere 5% of our daily bag total was responsible for an alarming amount of passenger inconvenience and possible ill will, as well as flight delays and poor bag room efficiency," Hemingway said.

Why only 5%? Principal reason, AA found, was the necessity of rush-handling these 300 bags on a very small time margin between incoming flights of other lines and AA's outgoing trips. Any delay of an incoming flight could mean that some bags "misconnected" or that AA suffered a late departure.

"The factor which prevented easy correction of our bag troubles was lack of control over the handling, since it was the responsibility of the other airlines to deliver bags to our outgoing planes," Hemingway said. "Even the other lines had little control since contact with their trucks was intermittent and largely at the option of the driver."

How Problem Was Solved

AA solved the problem by:

• **Installing Motorola** two-way low-power industrial radio in its panel trucks and at the dispatcher's desk.

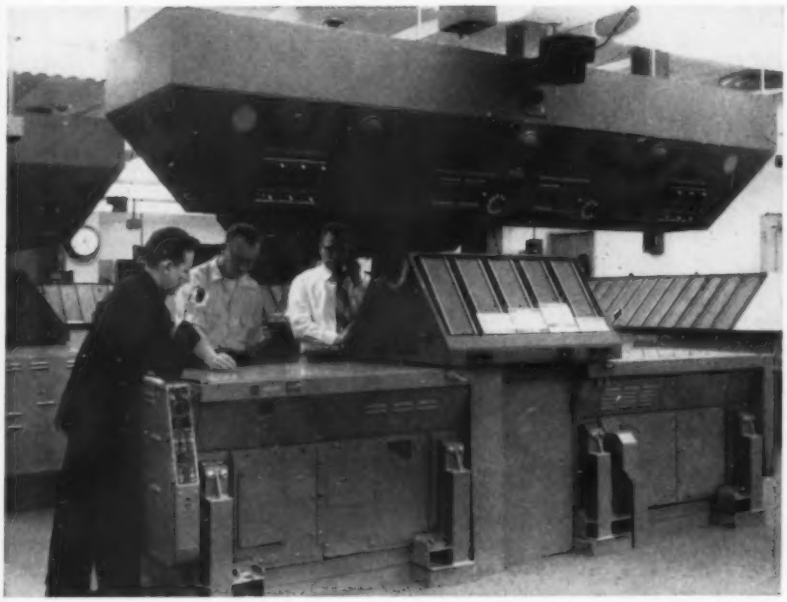
• **Obtaining permission** from other airlines for the radio-equipped trucks to go directly onto their ramps and pick up any AA-bound bags that were felt to require rush handling.

• **"Pre-expediting"** all interline bags arriving within about 20 to 25 minutes of departing AA flights. AA's bag room radio-dispatches the panel trucks to other airlines to pick up these bags. "For example," Hemingway explained, "if the truck is en route to a particular ramp and our dispatcher learns that the flight is a few minutes behind schedule, he can radio the driver to pre-expedite bags from the other lines first. When the time interval is more than about 25 minutes, we let the other airlines deliver the luggage to us in the usual manner."

• **"Expediting"**—a procedure that goes into operation at the last minute. When an AA flight is ready to leave, the gate man may find that several bags are still undelivered. He phones the bag check numbers to the dispatcher who in turn radios them to one of the trucks. The missing bags are picked up immediately and rushed to the departing plane.

Use of the Motorola radio units has given AA control over its trucks and the resultant speed and flexibility necessary to make the plan work. That it has worked is supported by Hemingway's statement that baggage-handling at Chicago is now "well over 95% efficient," whereas it was once less than 70%. ◈ ◈ ◈

Idlewild Gets $1-Million ATC Center And New Approach Lighting System



HEART of the Air Traffic Control Center at New York's Idlewild Airport are the long-range radar scopes. Four horizontal scopes (with two standbys) will, when operative, subordinate the role of the old-time fix-posting. Doing a dry-run are R. M. Brown, facilities division chief of CAA Region I; John Pfalzgraf, construction supervisor, and Ralph Hopper, chief air route traffic controller.

New York International Airport this month was the arena for two major CAA moves toward solution of the air traffic control problem plaguing the airways. A new $1-million air traffic control center that will be the pace-setter for radar coverage was put into action and a new type high-intensity approach lighting system was activated.

SCOPE SIMPLIFIES plotting by taking video presentation from the radar and projecting it on horizontal glass plates in magnified form. Air route controllers are able to mark by plastic tabs on these plates the progress of all aircraft entering or leaving the control area. Learning how it's done is CAA Region I Administrator O. W. Young (left). Demonstrating are J. J. Regan, CAA Region I chief of operations branch (center), and R. M. Brown, facilities division chief.

The new control center, housed in a modern hangar built by the Port of New York Authority and leased to CAA, will become the first to use long range radar control when General Electric's FPS-8 radar (AMERICAN AVIATION, Jan. 16, p. 10) becomes operative some time in March. Designated TASR (Terminal Area Surveillance Radar) by CAA, the equipment has an ultimate range of 120 miles. But while gathering experience in its use, CAA will work within a 75-mile range initially, extending it as procedures are developed.

• **Besides allowing** only a five-mile longitudinal separation for approaching aircraft and a 10-minute longitudinal separation on IFR departures, the new radar, because of its horizontal scopes, will eventually subordinate the role of the antiquated fix-posting procedures. Fix-posting will be continued, but its role will become that of a double check and stand-by in case of equipment failure. Medium-range radar will supplement the controllers' data.

The center, designed for what is hoped to be maximum expansion, will be home to 209 controllers and other technicians. Sixty-one individual flight progress boards, equipped with 221 bays holding 3,500 fix-posting strip holders, have been provided.

Thirty channels are provided for radio-telephone communication between pilots and controllers, with one high frequency allotted for control of ocean area under the Center's jurisdiction. Forty-two transmitters and 48 receivers are required to handle these channels. To supplement this, 83 leased telephone circuits provide relaying communications from the Center through airline dispatchers, military operations bases and CAA Airways Communications.

Electronic Flash Approach

• **Also expected** to lessen air traffic control delays is the new Strobeacon centerline approach system developed by Sylvania Electric Products Inc. Installed at Idlewild under CAA contract, it is known as EFAS (electronic flash approach system). The lights have been installed on platforms, built by the Port of New York Authority on a pier extending 2,500 feet into the water.

Twenty flashing units are placed at a distance of 1,000 feet from the end of the runway to 3,000 feet, at 100-foot intervals. The reflectors give a 25-degree beam which intercepts the electronic glide path at a point 1,600 feet in front of the particular lamp.

Each tube fires twice every second. The units flash in sequence toward the runway, giving the effect of an animated arrow pointing at the runway. Principal advantage cited by airline pilots for the EFAS system is immediate identification, direction and rapid transition from instrument to visual approach. The light units have the ability to penetrate fog and low clouds, and enable the pilot to clearly orientate his position. ◈ ◈ ◈

PILOT'S VIEW of Sylvania's new electronic flash approach system, designed to guide planes in on approach during limited visibility at Idlewild. Expected to reduce flight delays and cancellations, and lessen control problems, the Strobeacon system consists of 20 units in a single 2,000 foot row along the approach path leading to the runway.

Russian Concept of A-Powered 6,000-12,000 mph Transport of Future

Russia has disclosed a new design concept of the future's atom-powered air transports.

The Soviet magazine *Ogonyok* envisions huge, multi-decked, needle-nosed craft that will fly around the earth on fixed courses for weeks or months at a time without making a landing to take on or discharge passengers, cargo and mail. Instead, small feeder planes will carry out midair loading and unloading operations at specific points along the larger ship's route.

Ogonyok predicts the Intercontinental "mother" planes will fly high in the stratosphere at speeds of from 6,000 to 12,000 miles per hour.

The magazine says the powerplant will be either an atomic reactor (similar to types now known) used in conjunction with a turbojet engine or a radical new engine containing uranium dust. The uranium dust would heat the air passing through the engine in much the same way as ignited liquid fuels heat the air in conventional turbojet engines.

EAL, Colonial Work Out Merger Details

Eastern Air Lines and Colonial Airlines were busy at presstime ironing out details which will permit consummation of their merger deal sometime in April.

The merger agreement was approved by CAB early last month and by President Eisenhower January 25. As is customary in airline merger cases. final transfer of Colonial's certificate to Eastern must await a showing by the parties that all conditions, primarly involving labor matters, have been met or accepted.

The agreement was entered by the two companies January 28, 1955. It was approved by the Government just three days before a January 28, 1956 deadline set by the carriers for automatic termination.

• **A previous agreement** between Eastern and Colonial was approved by CAB in 1954 but turned down by President Eisenhower on findings that EAL had gained "illegal control" of Colonial. Early last year, CAB found that such control had been terminated.

National Airlines had opposed the deal on grounds that control still existed and that the "lawbreaker should not be rewarded." In dismissing these charges, CAB said: "The fact that Eastern had unlawfully acquired control of Colonial in the past is not considered to be a bar to approval of the new agreement, since such unlawful control had been terminated prior to the making of the new agreement, which was the result of arm's length bargaining."

National also lost out on its unprecedented petition to the President in which it objected that CAB refused to grant it full hearings in the merger case. The President, through his special counsel Gerald D. Morgan, refused to render a decision on the "legal questions" raised by National.

Under the approved merger deal, Colonial's assets, including routes, will go to Eastern in exchange for 257,800 shares of EAL common stock. Eastern plans to operate the new routes without subsidy and, for the first time, will have access to such points as Montreal in the north and Bermuda in the west.

CAB Seeks Comment On 'Copter Rules

CAB has set March 31 as the deadline for industry comment on two major rule proposals that will govern future airline helicopter operations.

Civil Air Regulation Draft Release No. 56-2, now in the form of a third draft proposal by CAB, will institute Part 46 to govern these operations in the same fashion that Parts 40, 41 and 42 control airline fixed-wing aircraft operations.

Another draft release, No. 56-3, proposes revision of CAR Part 21 to set new pilot qualifications for airline helicopter transport ratings.

Key issues of controversy in both proposals are centered around helicopter pilots. For want of more operating experience with large helicopters, the Board now plans to use present fixed-wing crew time limitations. It had proposed earlier that time limits for helicopter pilots be more restrictive than those of fixed-wing operations.

In proposed Part 21, the Board will give special consideration to airline pilots with fixed-wing experience in qualifying for helicopter ratings. An applicant holding valid airline transport ratings, who completes 100 hours of helicopter training and demonstrates his ability to CAA, will be authorized to fly as pilot-in-command of airline helicopters in lieu of qualifications set for other pilots.

These other qualifications require that an applicant hold a commercial and instrument rating with at least 1,200 hours time as pilot within the last eight years. Of this, 500 hours shall have been in cross-country flight, 100 hours in night flying and 150 hours in helicopters.

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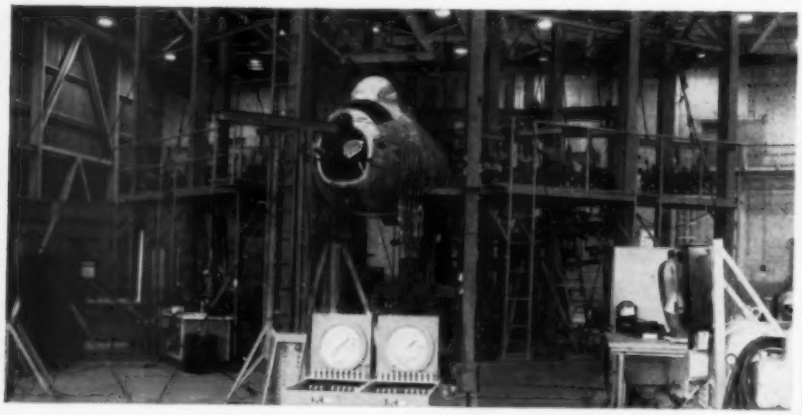

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CAB NEWS

CAB Applications

Trans World Airlines applied for extension until September 15 of special tariff setting $160 round-trip transcontinental coach fare, which otherwise would expire March 15.

St. Louis Chamber of Commerce has asked for immediate exemptions permitting **American Airlines** and **Eastern Air Lines** to operate nonstop between St. Louis and New York. Both carriers now must make one stop on such flights.

Southwest Airways has asked **CAB** approval, if necessary, of purchase of three Martin 2-0-2s from Pioneer Aeronautical Services.

Pending Cases

The **Seven States Area Investigation**, activated by **CAB** last month, and involving new local service in seven mid-western states, is generally considered the first of several "area" cases in which the Board aims to strengthen local service route systems. According to present thinking, trunkline participation in such cases will largely be concerned with trunkline suspensions at points served or to be served by local lines.

Although **CAB** and the President have approved the **Eastern-Colonial merger**, the carriers feel it will take up to 120 days (from Jan. 26) to complete arrangements for consummation of the deal. Meanwhile, **CAB** is withholding transfer of Colonial's certificate to Eastern.

The **Trans-Pacific Renewal Case**, decided last year by President Eisenhower as to all issues except Pan American's bid to fly the Great Circle route to Tokyo, has been reopened for further hearings by CAB at the President's direction. The President held PAA's application "in abeyance" for one year, then directed CAB to determine if any new facts have developed which will aid in a final ruling on the application. A prehearing conference will be scheduled in the near future.

CAB Calendar

Feb. 15—Oral argument, Houston-California Interchange Case. Washington, D. C. Docket 6597 et al.

Feb. 20—Hearing, Civil Air Transport Case. Tentative. Docket 7043.

Feb. 20—Hearing, Unaccompanied Children's Fare Investigation. Washington, D. C. Docket 7299.

Feb. 27—Hearing, International Freight Forwarder Investigation. Washington, D. C. Docket 7132.

Feb. 29—Oral argument, Delta-C&S Mail Rate Case (Offset Phase). Washington, D. C. Docket 2564.

Mar. 3—Hearing, Aerovias Brasil Foreign Permit Case. Washington, D. C. Docket 7478.

Recent CAB Decisions

Braniff Airways and **United Air Lines** authorized to suspend interchange operations between Seattle and Houston until June 1, 1957, to permit utilization of interchange equipment in recently-expanded online services.

American Airlines turned down on request to defer or restrict new all-cargo certificate of American Air Export & Import Co. because of "name confusion."

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Airline Commentary

By Eric Bramley

We have enjoyed many Erle Stanley Gardner mystery stories—but not his recent article, "The Case of the Exploding Airliner" in *American Weekly*. Topped by a gory illustration (showing an airliner exploding), the story purported to contain new "interesting elements" of the United Air Lines Longmont explosion. Only "new" information was how some of the passengers happened to be aboard. The rest was old hat. Our gripe, of course, is that the story harms air transportation. But aside from that, we didn't consider it much of a human interest piece, if that's what it was supposed to be. It was labeled as an Erle Stanley Gardner "true mystery." Only mystery is why it was ever written.

* *

Airlines get lots of mileage out of press releases about items that passengers leave on airplanes—false teeth, trousers, etc. We seldom bother to report 'em any more. However, here's one worth mentioning (and another "first" for United Air Lines): a man left a $2,000 Geiger counter on a UAL plane! UAL's release also contains a sign-of-the-times note: "Items lost in 1955 were of better quality than in any previous year."

* *

A certificate of convenience and necessity, in case you don't know, is a valuable paper an airline obtains from CAB after lengthy hearings. Certificates authorize carriers to operate scheduled service over designated routes. They ain't easy to come by. Now, we've never heard of one being lost in a crap game, but we learn that one recently changed hands at a tax auction. Seems that Uncle Sam sold at auction the properties of Bristol Bay Airlines, of Alaska, to collect back taxes. Ray Petersen, president of Northern Consolidated Airlines, was successful bidder for BBA's planes, equipment, etc. And he discovered that the tax boys had thrown in BBA's persons-property certificate as part of the package. CAB was a little concerned about another branch of the government treating its documents so lightly, but Petersen solved the problem by asking the Board to vacate BBA's certificate. His line already parallels most of the routes anyway.

Automatic portable projector that can be used in airline ticket offices, in training courses, etc., has been marketed by Tel-A-Story Inc. Machine has built-in 156-sq.-in. picture screen using twelve 35-mm. or square 2-by-2-inch full color transparencies, automatically changing copy every six seconds. Further information available from Dept. A, Tel-A-Story Inc., 523 Main St., Davenport, Iowa.

Sales, Traffic, Promotion

Best sales promotion piece of recent weeks was **American Airlines'** direct mailer on opening of Chicago-San Francisco non-stop service. Done in Gay 90s style, with illustrations, it was headed: "an announcement of importance to Ladies and Gentlemen traveling to and from the West." A real eye-catcher . . .

Northwest Airlines, in cooperation with Avis Rent-a-Car System, is introducing a new "fly-and-drive" plan under which a passenger paying $10 in addition to plane fare will have an Avis car at destination for 24 hours and 50 miles. Car can be kept longer at regular rates. Avis hopes to interest most of the airlines in the "get-acquainted" plan . . .

Three-week tour of Europe is being offered to flight personnel of U.S. airlines by **Scandinavian Airlines System** and **Lanseair Travel Service**, Washington, D.C. Cost of $515 includes fare (SAS is giving a 50% reduction), hotel rooms, breakfasts and sightseeing tours. Flight leaves New York on Apr. 14. Pilots, co-pilots, flight engineers, navigators, stewards and hostesses are eligible. A. L. Panza, Capital Airlines, 6 E. Monroe St., Chicago, is handling arrangements . . .

TWA asked CAB for six-months extension of its special $80 transcontinental coach tariff (Monday-Thursday, for round-trips completed within 30 days) which expires Mar. 15. E. O. Cocke, v. p.-sales, says there has been "tremendous public response" to the fare. Company's tourist traffic in fourth quarter of 1955 was 58.9% ahead of same 1954 period . . . About 360,000 people have taken TWA's "rocket trip to the moon" at Disneyland since the park opened last July . . .

TWA has launched a year-long "courtesy campaign" designed primarily for reservations and ticket sales agents. Series of courtesy posters (changed every two weeks) will be displayed at all reservations and ticket offices. Program was developed by Dean C. Wolf & Associates, Boston. This is similar to campaign conducted, with outstanding results, by Eastern Air Lines . . .

New series of 20 travel posters is being completed for **United Air Lines** by artists Joseph Binder and Stan Galli . . . **UAL** is testing a system of teleprinting airbills for freight on its Chicago-Denver-San Francisco route. Teleprinted airbill is sent to destination city over UAL's private lines, compared with former system of attaching a copy to each shipment. Several hours before shipment arrives, freight agent can inform consignee of all details, including flight on which the item is being carried. Pick-up arrangements can thus be completed well in advance. Another advantage is that outbound shipments received just before takeoff need no longer be held for a later flight because of time required to type out an airbill. Agent notes basic facts for airbill, which is teleprinted later, after shipment has departed . . .

Pan American World Airways has published an excellent book, "Fabulous Fishing in Latin America," a guide to the 60 best fishing areas in Mexico, Bahamas, Cuba, Jamaica, Puerto Rico, Panama, Bolivia, Peru, Uruguay, Chile and Argentina. Contains details on best times to fish, proper baits, where boats can be chartered, hotels, currency, tipping, etc. Book can be obtained for $1 at PAA ticket counters, through travel agents, or from PAA, P. O. Box 1111, New York 17, N. Y. . . .

Slick Airways has appointed Harry W. Graff Inc., of New York and Los Angeles, as its advertising and public relations agency. Former agency was Roy S. Durstine . . . **Air Express International**, freight forwarder, doing smart sales promotion job with direct mail piece showing graphically the savings possible through shipping by air instead of water . . . **Mohawk Airlines** is out with a giant-sized timetable, limited distribution only. Opened up, it measures 22½ by 33½ inches . . .

American Airlines has pulled all DC-7s off Washington-Chicago route. They're being used on new Chicago-San Francisco non-stop. **United Air Lines'** ads are plugging "only DC-7 service between Washington and Chicago" . . . Striking UAL national magazine ad stresses interline cooperation under head "Some of Our Best Customers Are Airlines" . . .

BOAC on Jan. 27 opened winter season first-class non-stop Stratocruiser service, twice weekly, New York-Montego Bay . . . **North Central Airlines** postponed opening of service at Chicago's O'Hare Field from Feb. 1 to Apr. 1 (tentative) . . . **Riddle Airlines** opened new cargo routes on Jan. 20 serving Miami, Jacksonville, Washington, Baltimore, Philadelphia, Boston, Atlanta, Cincinnati, Cleveland, Detroit and Chicago. Service starts Mar. 1 to Richmond, Louisville, Indianapolis and Columbus . . .

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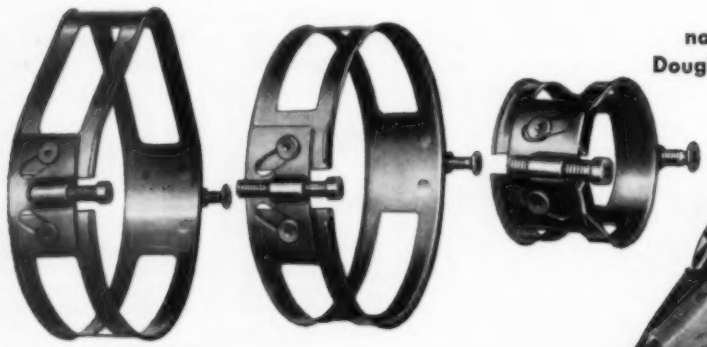

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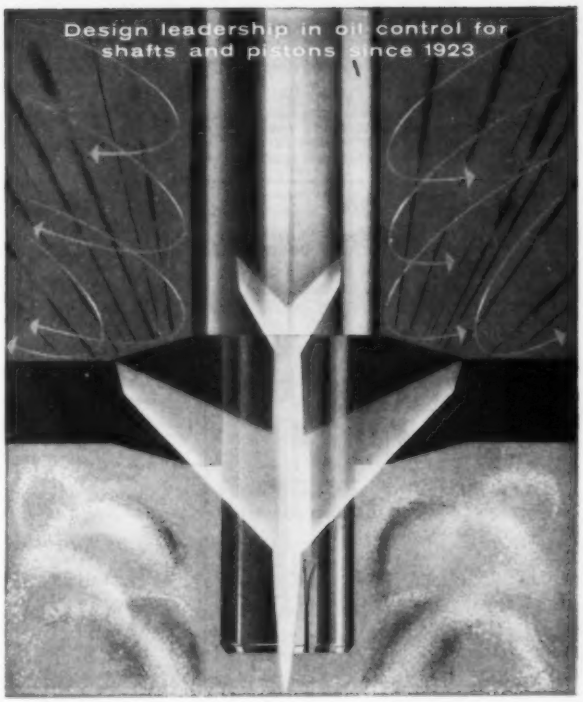

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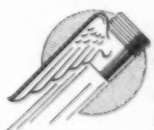

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SNCASE to Show Caravelle in U.S.

SNCA du Sud-Est will demonstrate the Caravelle jet transport in the United States in 1957, president Georges Hereil disclosed in New York recently. Republic Aviation Corp. will assist in the demonstration program (SNCASE builds Republic F-84 parts in France).

The first Caravelle prototype, which has logged some 225 hours to date, will be handed over to Air France for route proving trials in mid-1956. Air France has ordered 12 of the Avon-powered transports and has optioned a further 12. The first three Air France aircraft should be in service on European and Mediterranean routes in 1958 while the remainder will be delivered to the airline between 1959 and 1960.

The second prototype of the Caravelle should be completed in April 1956. Hereil said that the present design is the first of a whole family of jet transports—he mentioned a Caravelle II, Caravelle III and perhaps a "Sugar Caravelle." The aircraft has been designed so as to comply with the latest amendments to U.S. civil air regulations Part 4B in order to obtain American certification at the same time as French certification.

SNCASE is setting up a worldwide sales and servicing organization for the Caravelle. The only firm order at the moment is Air France's but CGTA-Air Algerie has optioned three while Trans-Australia Airlines is stated to be "very interested."

ICAO's Telephonic Alphabet Raises a Few Questions

Aviation's new radio telephone communications alphabet will become effective March 1 unless a majority of the 66 member nations of International Civil Aviation Organization object.

Here's the new alphabet, which immediately raises some questions:

A—Alfa	J—Juliett	S—Sierra
B—Bravo	K—Kilo	T—Tango
C—Charlie	L—Lima	U—Uniform
D—Delta	M—Mike	V—Victor
E—Echo	N—November	W—Whiskey
F—Foxtrot	O—Oscar	X—X-Ray
G—Golf	P—Papa	Y—Yankee
H—Hotel	Q—Quebec	Z—Zulu
I—India	R—Romeo	

The questions: Do you pronounce it "keelo" or "killo", "leema" or "lyma"? Also, do you spell it "whisky" for international spirits, or "whiskey" for U.S. domestic liquors?

Contracts

Recent Air Force contract awards announced by Commerce Dept. include:

Convair, San Diego, $50 million, for F-102A interceptors; $2,126,560, production facilities for F-102; $5,686,454, instrument installations in F-102.

Lockheed Aircraft Corp., Burbank, $36,720,767 for F-104A fighters and mobile training units; $1,300,000 and $5,468,944, T-33A aircraft and spares.

Westinghouse Electric Corp., Washington, $22,749,913, APQ-50 radar sets.

Aerojet-General Corp., Azusa, Calif., $9,000,000, facilities for pilot production and production testing of liquid rocket engines.

Kearfott Co., Little Falls, N. J., $2,504,855, components of J-4 compass system.

Admiral Corp., Chicago, $1,785,645, receiver-transmitters and components.

Erco Div., ACF Industries Inc., Hyattsville, Md., $1,030,343, C-123B flight simulator.

Air Products Inc., Allentown, Pa., $3,910,000, production facilities for liquid oxygen.

Bendix Products Div., South Bend, Ind., $1,268,161, F-104A wheel assemblies and maintenance.

Motorola Inc., Chicago, $1,143,794, radar set components.

Polan Industries, Huntington, W. Va., $3,051,720, airborne rocket launchers.

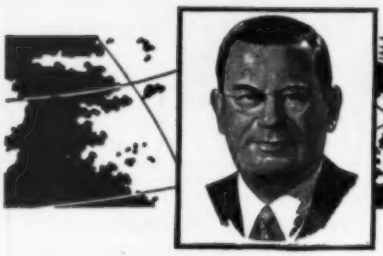
Curtiss-Wright Corp., Wood-Ridge, N. J., $3,795,000, overhaul of 600 XJ/J65 engines; $775,000, modification of 500 YJ/J65 engines.

Following contracts were announced by companies:

Temco Aircraft Corp., Garland, Tex., subcontracts from Lockheed Aircraft Corp. for development and production of wing tips and leading edge assemblies for Electra turboprop transport. Amount not disclosed.

Solar Aircraft Co., San Diego, Air Force contract for undisclosed number of 500-hp Jupiter gas turbine compressor packs to serve as aircraft engine starters.

Beech Aircraft, Wichita, Kans., $3,500,000, wings for Navy T2V jet trainer; $3,000,000 for Lockheed T-33 wings.



EN ROUTE . . .

WAYNE W. PARRISH

American Tourist in Leningrad

After dinner on this first night in Leningrad I walked out of the hotel and turned right for a rambling walk.

Through the snow I could make out a big church and some towers and massive statuary in squares, and in a few blocks I came to a park where kids were playing and laughing and walking on snowshoes. In the streets people were walking fast or waiting for buses and trolley buses, all of which seemed full to overflowing. I passed three drunks. One of them bumped into a woman with a dog and the woman gave him a big push into the snow. He got up mumbling but seemed to accept his fate without fighting back, and staggered down the street and into the dark entrance of an apartment building.

The street lights were bright but there was no color anywhere except for a few red and green traffic lights. I walked as far as a big plaza which I learned next day was the location of the former winter palace of the czars, and went for a few blocks along the main shopping street looking into the few windows where there were displays. One food store was open and there was quite a line waiting to be served. I was getting cold so I took a roundabout route back toward my hotel.

Old Women Shoveling Snow

What had I seen? It was impossible to size up the people as they hurried along all bundled up. There seemed to be no life or activity beyond people going someplace and buses moving along but there were no cafes or restaurants that I could see, or even any cinemas in this area. But I did see something which gives every westerner a shock and that was the gangs of old women shoveling snow. Lots of them. There are many thousands of women on the snow-shovel brigade day and night in every large city. It is quite a social security system they have in the U.S.S.R.—reach 60 and you're a cinch for shoveling snow. They supplement the snowplows and they work around the clock.

Back in my room I turned in for a long sleep. The tension leading up to my passing through the Iron Curtain had abated considerably. It was 11:30 in the morning before I got up and dressed. Outside it was still snowing and I had my first daytime view of the square with its six-story massive stone government buildings. Black figures were trudging through the snow and the snowplows were at work as always.

In the cold dining room I had brunch consisting of ham and eggs, not very well cooked, with soggy white bread, strawberry preserves, and tea. The waiter was inexperienced and knew no English. There were no fruit juices and no fresh fruit, at least during the winter. I had been warned that the coffee was unpalatable, but the tea was fair enough.

I reported in to the Intourist office and said I was ready to start seeing the city and its tourist attractions, and was told to report back at 2 p. m. and an interpreter would be on hand. I asked about exchanging some money—I hadn't even seen a ruble up to that point—and was told that travelers' checks could be cashed only at the main bank. Later I found out I could change greenbacks at the hotel and thus avoid the trip to the bank.

Naturally I was curious about what kind of interpreter (they never use the term guide) I'd have. So before 2 o'clock I reported back and here was a very pleasant woman of about 30, not beautiful but not unattractive, dressed in a wool coat with fur trimming, who spoke very good English. She asked me what I wanted to do and I said I was hardly in a position to outline my plans since I knew nothing of the city but I certainly wanted to see the Hermitage, the winter palace of the czars which is now an art museum. She said we should go there next morning to take advantage of more hours of daylight because it was already 2 in the afternoon and darkness comes early in Leningrad's winter.

So we decided on a sightseeing tour by car to be concluded with a visit to the new subway which had been open only a few weeks. In a few minutes a Zis car (the best in the USSR) was on hand and we began a rather complete drive through the downtown area, and on out to the new stadium which seats 100,000 people and about which my guide was very proud. I felt that she was a little disappointed that I didn't get overly excited about a stadium but a stadium is a stadium and we have a lot of them in the U.S. and so what.

City Still Has Grandeur

What I did find interesting were the buildings and traffic and bridges over the wide and deep Neva River and the shopping street and the large numbers of people walking somewhere from someplace. My guide kept up a running fire description. I asked her where she had learned her English and she said the Institute. It was obvious that she had never been in an English-speaking country because her English was academic although quite complete with a wide range of vocabulary. She was very friendly, very proud of Leningrad, and an excellent guide.

I imagine Leningrad is quite attractive in the summer time. It had been a handsome city in pre-revolutionary days and still retains some of its superficial grandeur. I had wanted to see the summer palace, which I understand is outstanding, but the area is closed in winter. I was not driven to the harbor, and come to think of it, it never occurred to me to ask to go there. At one point our Zis had a flat tire. The driver changed it in the bitter cold and drove us back to the hotel to change to another car, a Zim, for the remainder of the afternoon.

But let me tell you about the new Leningrad subway. I'd heard for years about the marble-lined plush Moscow subway, so I didn't know what to expect with this new one. Man and boy, it turned out to be a many-splendored deal, the most spectacular subway in the world and I've seen just about everyone anywhere.

We drove to the main downtown station at the end of the 6½ mile line. A long queue was waiting to go in, but my guide and I just by-passed the mob and walked into the first hall on the street level. This was my first experience at Intourist priority. My guide bought two tickets—about 12½c each—and we passed through a set of doors into a brightly-lighted marble hall from which fast-moving escalators led down to the station platform. I've seen some long escalators in London, but nothing as long and as fast as these. Leningrad is built on marshy islands and filled land, so the subway had to be far down.

There were lots of people, many of them sightseeing. Even my guide hadn't seen more than two of the eight stations. So I felt like a pioneer.

Everything Marble

It would be impossible to describe the eight stations. I've never seen so much marble and so many kinds and colors. Everything is marble—platforms, walls and ceilings. But the real surprise was the brilliant lighting. Huge ten-foot gilt, glass, bronze and other type of chandeliers hang over the tracks. The central platforms have elaborate lighting, each station different and some of them quite magnificent. One station even featured carved glass pillars, very attractive. Several had big bas reliefs or sculptured groups showing Stalin, Lenin, and historical scenes. Mosaics were used frequently.

I was no end impressed. At each station we got off to look around. A train came along every three minutes with split-second precision. At the end of each platform are two clocks, one a regular one and the other with a second hand showing the number of minutes and seconds remaining before the next train arrival. There were four clean, well-lighted, roomy and well-built cars on each train. My guide said she had the impression that the Moscow subway was better but for myself I couldn't see how it could be.

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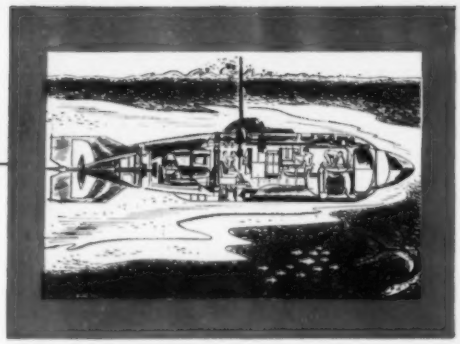

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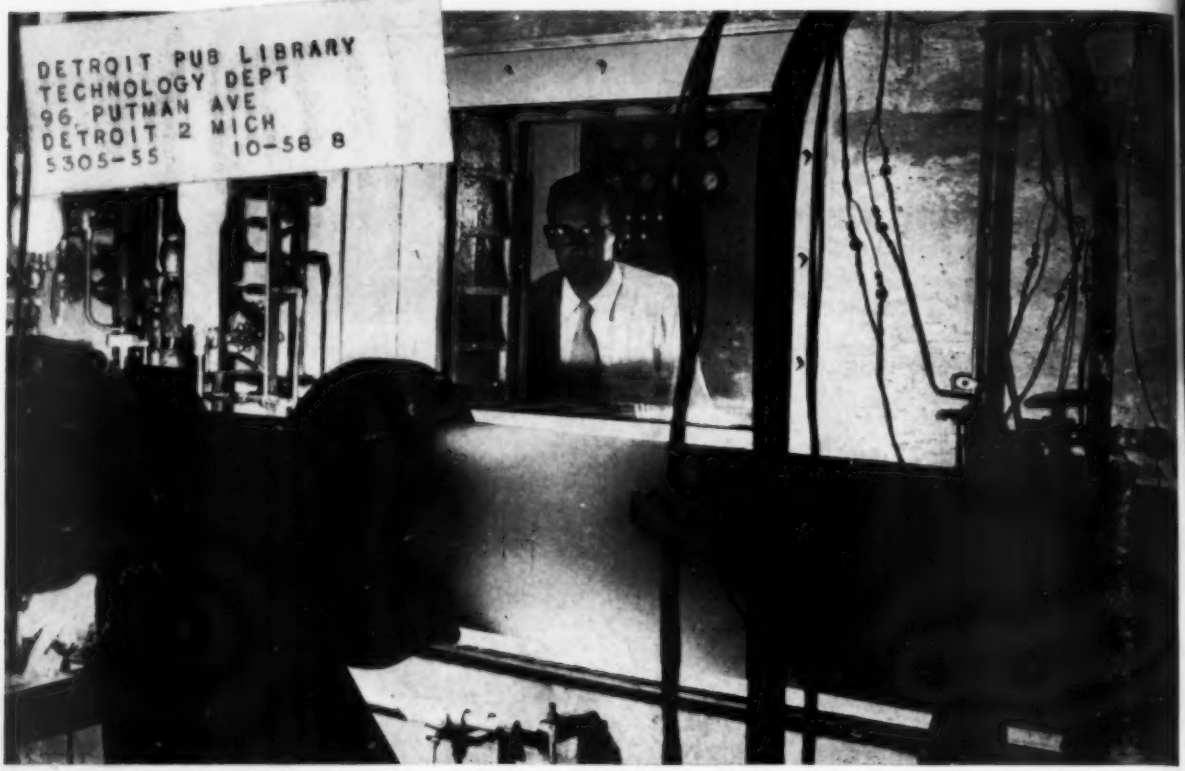

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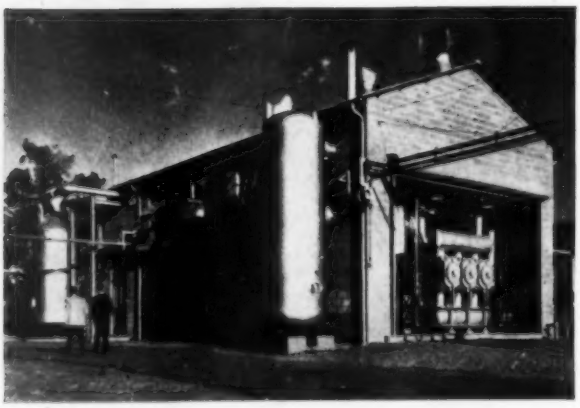

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